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CATALOGUE  
OF  
FOSSIL MAMMALIA.

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PART II.

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CATALOGUE  
OF THE  
FOSSIL MAMMALIA

IN THE

BRITISH MUSEUM,  
(NATURAL HISTORY)

CROMWELL ROAD, S.W.

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PART II.

CONTAINING

THE ORDER UNGULATA, SUBORDER ARTIODACTYLA.

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BY

RICHARD LYDEKKER, B.A., F.G.S., ETC.

LONDON:

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## PREFACE.



THE first part of this Catalogue, published in January last, contained the specimens belonging to the Orders PRIMATES, CHIROPTERA, INSECTIVORA, CARNIVORA, and RODENTIA. The present part is devoted to the Order UNGULATA, Sub-order ARTIODACTYLA. Of this sub-order the *Bovidae*, *Cervidae*, and the *Anoplotheriidae* have especially required much careful study and revision; nor have the other groups been catalogued without a very large expenditure of time and labour. In this task the author has been greatly assisted by Mr. William Davies, whose intimate knowledge of the history of the Collection is coeval with the acquisition of at least a large proportion of the specimens composing it.

The Perissodactyla and allied forms, and the Proboscidea, Sirenia, Cetacea, Edentata, and Marsupialia still remain to be catalogued.

It may be well to state here that these Catalogues do not in any way lay claim to be complete lists of all the fossil genera and species, but only of such as are represented in the Collection.

HENRY WOODWARD

British Museum  
(Natural History),  
Department of Geology,  
Nov. 20, 1885.





## INTRODUCTION.

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As a full Introduction has been given to the First Part, it is only necessary on the present occasion to add a few supplemental remarks.

In order to avoid extending the Catalogue to an unreasonable length, it has been considered advisable to omit all reference to the majority of the specimens contained in the Cavern Collection, at the entrance to the Fossil Mammalian Gallery, as, in most instances, these are but duplicates of specimens from other localities. For the same reason, in cases where the number of specimens of the remains of any one species is excessively numerous, only the more important of such specimens have been introduced into the Catalogue. Similarly, in cases like the Siwaliks of India and the French Phosphorites, where there are great numbers of species of Artiodactyle Ungulates, and it is very often apparently impossible to refer individual bones even to their respective genus, such specimens have not been catalogued here, as nothing would be gained by so doing.

Mention may be made of a few fossil localities noticed in the present part, which are not given in the table on pages x, xi of Part I.; but before doing so, it may be observed that the position of the Georgensgmünd<sup>1</sup> beds as given in that table should be transferred from the Upper Miocene to section *b* of the Middle Miocene<sup>2</sup>. The Lower Pliocene of Cucuron (Vaucluse) is equivalent to that of Mont Lebéron. The beds at Elgg (Zurich), Switzerland, correspond to those of Käpfnach. From the comparatively unaltered condition of many of the specimens in the Museum, and the circumstance that

<sup>1</sup> Misprinted "Georgensmünd."

<sup>2</sup> These beds were classed with those of Eppelsheim and Ceningen, on the ground that they were so placed by Schlosser in the 'Palæontographica,' vol. xxxi. p. 96 (1884), who has subsequently (Neues Jahrb. 1885, vol. ii. pp. 136-144) indicated their true position.

they apparently belong to existing species, the beds at La Combette, near Champeix (page 97), and those at Tour-de-Boulade, Puy-de-Dôme (Part I. p. 126), are provisionally referred to the Pleistocene, but they may be equivalent to the Upper Pliocene of Peyrolles, with which they were associated by P. Gervais.

Generic terms have been employed in a wider sense than is the case with many contemporary writers ; and I am permitted to say that my views in this respect are in the main those of Professor Flower. Thus a difference of one or more premolar teeth, or in the number of the digits, in allied forms has not been considered a bar to generic unity ; and accordingly the genus *Eurytherium* has been included in *Anoplotherium* (p. 188), while analogous instances will occur in Part III. in the case of the *Rhinocerotidæ* and *Equidæ*. Occasionally a genus (e.g. *Eporeodon*, p. 208) has been admitted which appears to be founded upon somewhat insufficient characters.

A few words may be advisable in regard to the specific identification of specimens from the Tertiaries of France and Germany, the most noticeable instance being that of the German *Palæomeryx medius* with the French *Amphitragulus boulangeri* and *A. pomeli* (p. 130). In the majority of such instances the identification has been guarded by a provisional reservation ; but as the specimens in the Museum apparently present no distinctive points of difference, the only logical course in each instance has been to include all of them under one specific heading. Different views are entertained by different writers as to the amount of variation in size which should be regarded as of individual or of racial value. In the case mentioned above Prof. Rüttimeyer takes larger limits than Dr. Filhol, the distinction between *A. boulangeri* and *A. pomeli* having been made by the latter writer on small differences in the size and proportions of the teeth of the lower jaw, all of which come well within the limits allowed by Prof. Rüttimeyer to *Palæomeryx medius*. The latter writer has already identified French specimens from the Middle Miocene of Isère with the German form ; and as the latter occurs in the Lower Miocene of Weissenau, near Mayence, it is *primâ facie* highly probable that it should be identical with the Lower-Miocene form of Allier. The probable respective identity of the German *Hyotherium meissneri* and *H. scemmeringi* with the French *Palæochærus typus* (*Hyotherium typum*, p. 254) and *P. major*<sup>1</sup>, together with that of the German *Microtherium renggeri* with the

<sup>1</sup> Vide Wilckens, Biol. Centralblatt, vol. v. p. 236 (1885).



French *Cænotherium commune*, are confirmatory of the foregoing views, and indicate (as might have been expected) that the Tertiary faunas of the German and French areas contain a large number of forms in common.

Considerable difficulty has been experienced in these and other instances in regard to the generic and specific names which should be adopted, as German writers almost invariably employ terms of German origin, while French authors have an equal partiality for those given by their own countrymen. In cases where the first published notice is clear and distinctive, the rule of priority has been followed; but there are many instances (notably those of H. von Meyer) where the original notice is so vague that it is practically useless, and in such instances the choice has fallen on the name which appears to have obtained most general acceptance, or was the first to be distinctly defined.

As in the First Part, the circumstance that specimens apparently indistinguishable from one another were obtained from different geological horizons has not of itself been considered a bar to their reference to the same species, although a provisional reservation has been adopted in some such cases.

The genus *Anoplotherium* (as here employed) is one of peculiar difficulty in regard to the association of the jaws and limb-bones of the various species; and no very definite conclusion has been arrived at. The Quercy astragalus mentioned in the Addenda (page 316) has somewhat increased the complexity of the problem; but if the form to which it belonged be really distinct from the so-called *Eurytherium latipes*, yet, in the absence of any distinction in dental characters, it would seem inadvisable that it should receive a distinct name. The following Collections are additional to those enumerated in Part I. pp. xi, xii:—

*Bowerbank Collection*.—Purchased in 1865 from the late Dr. J. S. Bowerbank, F.R.S., of Highbury.

*Layton Collection*.—Consists mainly of specimens dredged off Happisburgh, Norfolk, and was purchased from the Rev. John Layton, of that place, in 1858.

*Sloane Collection*.—Purchased from the executors of Sir Hans Sloane, of Chelsea, about 1754.

*Wigham Collection*.—Collected by Mr. Wigham, of Norwich, and purchased in 1859 from Mr. T. G. Bayfield, of the same town.

My thanks are again due to Mr. W. Davies, F.G.S., not only for

much valuable information in regard to individual specimens, but also for verifying each specimen with its description, by which absolute accuracy is secured in this respect. Thanks are also due to Prof. Boyd-Dawkins, of Owens College, for valuable assistance in the determination of the remains of *Cervus* and its allies; and to Mr. H. B. Medlicott, Superintendent of the Geological Survey of India, to Prof. L. Rüttimeyer, of Basle, and to the Council of the Geological Society of London, for the loan of woodcuts illustrating this and the preceding Part.

Owing to the purchase of certain specimens after the sheets of this Part were in type, and also to the circumstance that others had been displaced during the rearrangement of the Museum, it has been necessary to introduce several Addenda, which render the work more complete, but less symmetrical than I could have wished.

RICHARD LYDEKKER.

The Lodge, Harpenden,  
Hertfordshire,  
October 31, 1885.

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ABBREVIATIONS OF SERIALS QUOTED IN PART II.,  
AND NOT GIVEN IN THE LIST ON pp. xxvii-xxx OF PART I.

[Where not otherwise stated, the works are in 8vo.]

- 
- Ann. Lyc. Nat. Hist. N. York.*—Annals of the Lyceum of Natural History, New York. *New York.*
- Ann. Mag. Nat. Hist.*—Annals and Magazine of Natural History. *London.*
- Archiv für Mineralogie.*—Archiv für Mineralogie, &c., &c. (Karsten). *Berlin.*
- Beitr. Pal. Oest.-Ung.*—Beiträge zur Paläontologie Oesterreich-Ungarns und des Orients. 4to. *Vienna.*
- Biol. Centralblatt.*—Biologisches Centralblatt. *Erlangen.*
- Bull. Soc. Vaud. Sci. Nat.*—Bulletin de la Société Vaudoise des Sciences Naturelles. *Lausanne.*
- Denkschr. schw. Ges. Nat.*—Neue Denkschriften der allgemeinen Schweizerischen Gesellschaft. 4to. *Zürich.* (Differently quoted in Part I. of this work.)
- Geologist.*—The Geologist, a popular illustrated monthly magazine of Geology (Mackie). *London.*
- Jahresh. Ver. Nat. Württ.*—Jahreshefte des Vereins für vaterländische Naturkunde in Württemberg. *Stuttgart.*
- Journ. Ac. Nat. Sci. Philad.*—Journal of the Academy of Natural Sciences of Philadelphia. 4to. *Philadelphia.*
- Journ. de Physiologie.*—Journal de Physiologie expérimentale (Magendie). Vols. i.-ix. (1821-1831). *Paris.*
- K. Svenska Vet.-Akad. Handl.*—Kongliga Svenska Vetenskaps-Akademiens Handlingar. 4to. *Stockholm.*
- Mem. R. Ac. Sci. Turin.*—Memorie della Reale Accademia delle Scienze di Torino. 4to. *Turin.*
- Proc. Ac. Nat. Sci. Philad.*—Proceedings of the Academy of Natural Sciences of Philadelphia. *Philadelphia.*
- Proc. Amer. Phil. Soc.*—Proceedings of the American Philosophical Society held at Philadelphia, &c. *Philadelphia.*
- Proc. R. Soc.*—Proceedings of the Royal Society of London. *London.*
- Smith. Contrib. Know.*—Smithsonian Contributions to Knowledge. 4to. *Washington.*

## CORRIGENDA TO PART I.

- 
- Page 17. *Crossopus fodiens* and *C. remifer* are identical.
- „ 20, line 6 from top, Cope includes only four families (*Chrysochloridæ*, *Centetidæ*, *Potamogalidæ*, and *Talpidæ*) of the Insectivora in the Creodonta.
- „ 43, No. 28845 x, for Lower Pliocene read Upper Pliocene.
- „ 45, line 23 from bottom, for fig. 4 read fig. 2.
- „ 92, No. 37137, after p. 309 add pl. xxxv A. fig. 4.
- „ 123, note 4, for p. 50 read p. 58.
- „ 131, line 5 from top, for vol. ii. read vol. i.
- „ 154, note 1 read Rec. Geol. Surv. Ind. vol. xi. p. 104 (1878).
- „ 155. In description of fig. 22, for premolar read molar.
- „ 191, note 4, after Memoirs add vol. i.
- „ 220, line 16 from top, for Käpnach read Käpfnach.
- „ 224, line 8 from bottom, { for Ellobius read Eliomys.
- „ 225, „ 14 „ } „
- „ 260, line 4 from bottom, for tumidus read timidus.

CATALOGUE  
OF  
FOSSIL MAMMALIA.

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PART II.

Order UNGULATA.

Suborder ARTIODACTYLA.

Although in earlier works the writer has subdivided the fossil Artiodactyla into sections, a more extended survey has convinced him that any such divisions are at present impracticable, as all the groups seem to pass more or less completely into one another.

Family BOVIDÆ<sup>1</sup>.

*Dentition*, usually:—I.  $\frac{0}{3}$ , C.  $\frac{0}{1}$ , Pm.  $\frac{3}{3}$ , M.  $\frac{3}{3}$ . This and the next two families, which, together with the *Antilocapridæ*, constitute the Pecora of recent Zoology, are characterized by the perfectly selenodont structure of the true molars, of which each of the upper ones carries four columns, by the coalescence of the third and fourth metapodials into a 'cannon-bone,' and by the union of the cuboid and navicular elements of the tarsus. It is not certain whether some of the fossil genera ranged under the *Tragulidæ* can be distinguished from this group of families.

<sup>1</sup> Flower observes that "the [recent] generic divisions of this family are still in an unsatisfactory state, and require careful and critical revision;" adding that many adopted in Part ii, of his 'Catalogue of the Mammalia in the Museum of the Royal College of Surgeons' (1884), "are founded on trivial characters very difficult of definition."



Genus **BOS**, Linn.<sup>1</sup>**Bos taurus**, Linn.<sup>2</sup>

It has been shown by Boyd-Dawkins<sup>3</sup> that the so-called *Bos primigenius* is in all probability the ancestor of the larger existing cattle of Western Europe; "the wild cattle of Chillingham Park, Northumberland, being probably the last surviving representative of the gigantic Urus of the Pleistocene period, reduced in size, and modified in every respect by their small range and their contact with man." The same authority<sup>4</sup> likewise comes to the conclusion that *Bos longifrons*, Owen, is an ancestral form of the small existing Scotch and Welsh cattle.

*Hab.* "Europe, and, as a domestic animal, the greater part of the habitable world" (*Flower*).

Var. *primigenius* (Bojanus<sup>5</sup>).

Syn. *Bos primigenius*, Bojanus<sup>6</sup>.

*Bos urus*, Boyd-Dawkins<sup>7</sup>.

*Bos giganteus*, Owen<sup>8</sup>, MS.

The writer has found it totally impossible to distinguish the detached jaws, teeth, and skeletal bones of this form from those of the contemporaneous *Bison*; the very large series in the Museum showing such an amount of variation in absolute size and relative proportion as apparently to forbid any such division. Under these circumstances nearly all the specimens are provisionally referred to the present form, as being the commoner of the two.

**M. 2245.** The cranium; from the Pleistocene of Athol, Perthshire. (*Fig.*) This fine specimen is described and figured by Owen in the 'British Fossil Mammals and Birds,' pp. 501-2, figs. 208, 210; the figure of the frontal aspect being repro-

<sup>1</sup> Syst. Nat. ed. 12, vol. i. p. 98 (1766).

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Quart. Journ. Geol. Soc. vol. xxii. pp. 391-401 (1866).

<sup>4</sup> *Ibid.* vol. xxiii. pp. 176-185 (1867).

<sup>5</sup> Nova Acta Ac. Cæs. Leop.-Car. vol. xiii. pt. 2, p. 422 (1827). <sup>6</sup> *Loc. cit.*

<sup>7</sup> Quart. Journ. Geol. Soc. vol. xxii. p. 392 (1866).

<sup>8</sup> In Davies's 'Catalogue of the Pleistocene Vertebrata in the Collection of Sir Antonio Brady,' p. 47 (1874). (*Privately printed.*)

duced on a smaller scale in the accompanying woodcut. The length of the cranium is 0,912; and the span of the horn-cores 1,064.

*Presented by David Inglis, Esq., about 1836.*

Fig. 1.



Fig. 1. *Bos taurus*, var. *primigenius*. The cranium; from the Pleistocene of Athol. About  $\frac{1}{2}$  nat. size.

**36405.** The cranium and the right ramus of the mandible of a smaller specimen, wanting all the cheek-teeth except m. 3; from the turbarry of Kirkcudbrightshire.

*Presented by the Earl of Selkirk, 1859.*

**50086.** The cranium; from the Pleistocene of Ilford, Essex.

*Purchased, 1878.*

**45424.** The cranium; from the Pleistocene of Ilford. This fine specimen wants the alveolar portion of the maxillæ, the palate, and teeth, but is otherwise nearly perfect. The horn-cores curve outwards and forwards, with an inward and upward inclination at their extremities. The length of the face is 0,635, and the span of the horn-cores 0,609.

*Brady Collection. Purchased, 1878.*

**45425.** The calvarium and horn-cores, with another fragment of the same skull comprising the maxillæ and palate with m. 2 and m. 3 of either side in place; from the Pleistocene of Ilford. When found, this cranium was nearly entire, but was broken in its removal.

*Brady Collection. Purchased, 1878.*

**45426.** A pair of horn-cores, the frontals wanting; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

**45427.** The calvarium and horn-cores; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

**45428.** The horn-cores, with part of the frontals; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

**45429.** The frontals and horn-cores, with the occiput and condyles entire; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

**45430.** The frontals and horn-cores, with the occiput, condyles, and basioccipital; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

**45431.** The horn-cores and the upper portion of the frontals; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

**45432.** The frontals and horn-cores, with the occiput, condyles, and basioccipital; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

**33888.** The calvarium and horn-cores; from the Pleistocene near Herne Bay, Kent.

*Presented by Wickham Flower, Esq., 1859.*

**M. 2342.** The calvarium and horn-cores; from the Pleistocene of Clacton, Essex.

*Presented by John Brown, Esq., 1852.*

**33471.** Occipital portion of the cranium; locality unknown.

*Layton Collection. Purchased, 1858.*

*In addition to the preceding specimens, the Museum contains a considerable number of imperfect crania and horn-cores, from Pleistocene deposits, of which the following may be noticed:—*

**21304**, from Grays (*Purchased, 1847*).—**27871**, from Clacton (*Presented by J. Brown, Esq., 1852*).—**33471**, probably from Norfolk (*Layton Collection. Purchased, 1858*).—**45433**, **44535**, from Ilford (*Brady Collection. Purchased, 1878*).—**46881**, from the bed of the Thames below London (*Presented by the Commissioners of the Metropolitan Board of Works, 1875*).—**M. 394**, from Northwich, Cheshire (*Egerton Collection. Purchased, 1882*).

- 38511.** The middle portion of the cranium, containing the three true molars on each side ; from the Pleistocene of Ilford.  
*Purchased, 1864*
- 45448.** Two specimens of the upper cheek-dentition, one containing all the teeth, and the other the three true molars, with the detached fourth left upper premolar ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45449-55, 45460-62.** Nine detached upper true molars ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 36406.** The third left upper true molar, with the grinding-surface cut and polished ; from the turbarry of Kirkcudbrightshire, associated with the cranium No. 36405.  
*Presented by the Earl of Selkirk, 1859.*
- 41531.** Upper molars, apparently belonging to this form ; from the turbarry of Walthamstow, Essex.  
*Purchased, 1869.*
- 33889.** The right ramus of the mandible, wanting the cutting-teeth ; from the Pleistocene of Herne Bay. Associated with the calvarium No. 33888.  
*Presented by Wickham Flower, Esq., 1859.*
- 45463.** The nearly entire right ramus of the mandible, wanting the coronoid process, and containing all the cheek-teeth except  $\overline{\text{pm. 2}}$ , in a well-worn condition ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45464.** The right ramus of the mandible, with the last four cheek-teeth ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45465.** The right ramus of the mandible, wanting part of the condyle, with  $\overline{\text{m. 1}}$  and  $\overline{\text{m. 2}}$  ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45466.** The right ramus of the mandible, with all the cheek-teeth, except  $\overline{\text{pm. 2}}$ , in a much-worn condition ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45467.** Part of the right ramus of the mandible, wanting the symphysis and coronoid process, and containing the four last cheek-teeth ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*



45468. Part of the right ramus of the mandible, containing all the cheek-teeth except  $\overline{\text{pm. 2}}$ ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45469. Part of the right ramus of the mandible, with the three true molars; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45470. The nearly perfect left ramus of the mandible, with the three true molars; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45471. The greater part of the left ramus of the mandible, imperfect anteriorly, containing the three true molars; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45472. The left ramus of the mandible, containing  $\overline{\text{m. 2}}$  and  $\overline{\text{m. 3}}$ ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45473. The greater part of the left ramus of the mandible, containing the three true molars, in a much-worn condition; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
21306. Hinder part of the left ramus of the mandible, containing  $\overline{\text{m. 2}}$  and  $\overline{\text{m. 3}}$ ; from the Pleistocene of Ilford.  
*Purchased, 1847.*
18965. Part of the left ramus of the mandible, containing  $\overline{\text{m. 2}}$  and  $\overline{\text{m. 3}}$ ; from the Pleistocene of Ilford. *Purchased, 1845.*
19843. Part of the right ramus of the mandible, containing the three true molars; from the Pleistocene of Grays, Essex.  
*Purchased, 1846.*
21307. Fragment of the right ramus of the mandible, containing  $\overline{\text{mm. 3}}$ ,  $\overline{\text{m. 4}}$ ,  $\overline{\text{m. 1}}$ , and  $\overline{\text{m. 2}}$ ; from the Pleistocene of Ilford.  
*Purchased, 1847.*
36340. The left ramus of the mandible, containing the three true molars; from the Pleistocene of Crayford, Kent.  
*Presented by C. M. Doughy, Esq., 1862.*
- 36340 a. The right ramus of the mandible, containing  $\overline{\text{m. 2}}$  and  $\overline{\text{m. 3}}$ ; from the Pleistocene of Walton-on-the-Naze, Essex.  
*Presented by John Brown, Esq., 1852.*

45476. Fragment of the left ramus of the mandible, containing all the cheek-teeth except  $\overline{\text{pm. 1}}$ ; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
23738. Fragment of the left ramus of the mandible, containing the last four cheek-teeth; from the Pleistocene of Slade Green, near Erith, Kent. *Purchased, 1849.*
- 45482-88, 45491-95, 45503-05. Fourteen detached specimens of first and second lower true molars; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 45497-502, 45504. Seven detached specimens of the third lower true molar; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
44803. The third right lower true molar of a *Bos*; from the Pleistocene of Nice. (? *Bos elatus*.) *Presented by B. Bright, Esq., 1873.*
45557. The right scapula; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
45811. The greater part of the left scapula; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
45559. The glenoidal third of the left scapula; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
28021. The greater part of the right scapula; from the Pleistocene of Clacton. *Presented by John Brown, Esq., 1852.*
45561. The right humerus; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
48049. The right humerus; from the Pleistocene of Ilford. *Purchased, 1877.*
20014. The right humerus; from the Pleistocene near Northampton. *Purchased, 1846.*
46854. The right humerus; from the Pleistocene of Greenwich, Kent. *Purchased, 1875.*
46127. The right humerus; dredged off the eastern coast of England. *Owles Collection. Purchased, 1874.*
36411. The right humerus; from the turbarry of Kirkeudbrightshire; associated with the cranium No. 36405. *Presented by the Earl of Selkirk, 1859.*

- 45563.** The left humerus of a smaller form ; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 45564.** The left humerus, similar to the last ; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 23120.** The distal portion of the right humerus ; from the Pleistocene of Slade Green, near Erith, Kent. *Purchased, 1849.*
- 21290.** The left radius and ulna ; from the Pleistocene of Ilford. *Purchased, 1847.*
- 45579.** The left radius and ulna ; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 48050.** The left radius and ulna ; from the Pleistocene of Ilford. *Purchased, 1877.*
- 45578.** The left radius and ulna, wanting the olecranon ; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 21299.** The left radius ; from the Pleistocene of Ilford. *Purchased, 1847.*
- 23750 e.** The left radius and ulna of a smaller form ; from the Pleistocene of Slade Green. *Purchased, 1849.*
- 20015.** The right radius and ulna, wanting the olecranon ; from the Pleistocene of Ilford. *Purchased, 1847.*
- 23749 e.** The right radius and ulna, wanting the olecranon ; from the Pleistocene of Slade Green. *Purchased, 1849.*
- 21299 c.** The right radius and ulna, wanting the olecranon, of a smaller form ; from the Pleistocene of Slade Green. *Purchased, 1847.*
- 20801.** The right radius and the distal half of the ulna ; from the Pleistocene of Grays, Essex. *Purchased, 1847.*
- 28003.** The left metacarpus, of large size ; from the Pleistocene of Clacton. *Presented by John Brown, Esq., 1852.*
- 45599.** The left metacarpus, of large size ; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 36412.** The left metacarpus, rather smaller than the last ; from the turbarry of Kirkeudbrightshire. Associated with the cranium No. 36405. *Presented by the Earl of Selkirk, 1859.*

46130. The left metacarpus, considerably shorter than either of the preceding; dredged on the Dogger Bank.  
*Owles Collection. Purchased, 1874.*
45600. The right metacarpus, like No. 45599; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
16887. The right metacarpus, somewhat smaller than the last; from Kent's Cavern, Torquay.  
*McEnery Collection. Purchased, 1842.*
- 242 (O.C.). The right metacarpus, agreeing very closely with the last; from Kirkdale Cave, Yorkshire.  
*Presented by W. Salmond, Esq. Before 1836.*
16889. The right metacarpus, of smaller size; from Kent's Cavern.  
*McEnery Collection. Purchased, 1842.*
- 23724 e. The right metacarpus, of a more slender type; from the Pleistocene of Slade Green.  
*Purchased, 1849.*
- 23724 e 1. The left metacarpus of a still more slender type; from the Pleistocene of Slade Green.  
*Purchased, 1849.*
23729. The left metacarpus and phalangeals; from the Pleistocene of Slade Green.  
*Purchased, 1849.*
- M. 497. The right metacarpus; from the Pleistocene of Boltons, Old Brompton, London.  
*Presented by J. G. Spicer, Esq., 1883.*
27981. The right metacarpus; from the Pleistocene of Clacton.  
*Presented by John Brown, Esq., 1852.*
46129. The right metacarpus, of large size; dredged on the Dogger Bank.  
*Owles Collection. Purchased, 1874.*
28578. The right metacarpus, of small size; from a cave in Sundwig, Westphalia.  
*Purchased, 1853.*
40706. The right scaphoid; from the Pleistocene of Ilford.  
*Purchased, 1867.*
- 23713 e. The left scaphoid; from the Pleistocene of Slade Green.  
*Purchased, 1849.*
21298. The left lunar; from the Pleistocene of Slade Green.  
*Purchased, 1849.*
- 21298 a. The left lunar; from the Pleistocene of Slade Green.  
*Purchased, 1849.*



- 23713 e 1.** The left cuneiform ; from the Pleistocene of Slade Green.  
*Purchased, 1849.*
- 36627.** The left cuneiform ; from the Pleistocene ; locality unknown.  
*Purchased, 1857.*
- 23729 a.** Two specimens of the left magnum ; from the Pleistocene of Slade Green.  
*Purchased, 1849.*
- 21298.** Two specimens of the right unciform ; from the Pleistocene of Slade Green.  
*Purchased, 1847.*
- 36449.** A proximal phalangeal, of very large size ; from the Pleistocene near Peckham, Surrey.  
*Purchased, 1864.*
- 28018.** A proximal phalangeal ; from the Pleistocene of Walton.  
*Presented by John Brown, Esq., 1852.*
- 255 (O. C.).** A proximal phalangeal ; from Kirkdale Cave.  
*Presented by W. Salmond, Esq. Before 1836.*
- 27948.** A proximal phalangeal ; from the Pleistocene of Hedingham, Essex.  
*Presented by John Brown, Esq., 1852.*
- 255 a (O. C.).** A terminal phalangeal ; from Kirkdale Cave.  
*Presented by W. Salmond, Esq. Before 1836.*
- 45643.** The nearly complete pelvis and sacrum ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45645.** The left innominate, showing the acetabulum and the cotyloid notch and scar entire ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 36410.** The right innominate ; from the turbarry of Kirkcudbrightshire. Associated with the cranium No. 36405.  
*Presented by the Earl of Selkirk, 1859.*
- 36413-4.** The right and left femora ; from the turbarry of Kirkcudbrightshire. Associated with the last.  
*Presented by the Earl of Selkirk, 1859.*
- 45653.** The right femur ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45654.** The right femur ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45655.** The left femur ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*

45652. The left femur ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
38093. The left femur ; from the Pleistocene of Grays.  
*Purchased, 1864.*
33934. The left femur ; from the Pleistocene of East Wickham,  
Kent. *Presented by Henry Edgell, Esq., 1859.*
20799. The distal portion of the left femur ; from the Pleistocene of  
Ilford. *Purchased, 1847.*
45663. The distal portion of the right femur ; from the Pleistocene  
of Ilford. *Brady Collection. Purchased, 1878.*
19848. The distal portion of the right femur ; from the Pleistocene  
of Grays. *Purchased, 1846.*
27964. The left tibia ; from the Pleistocene of Walton.  
*Presented by John Brown, Esq., 1852.*
45672. The left tibia ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
23123. The left tibia, of small size ; from the Pleistocene of Maid-  
stone, Kent. *Purchased, 1849.*
- 23123 a. The left tibia ; from the Pleistocene near Chelsea Hospital.  
*Presented by Thomas Faulkner, Esq., 1838.*
45671. The right tibia ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45673. The right tibia ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45674. The right tibia ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45680. The right tibia, smaller than the last ; from the Pleistocene  
of Ilford. *Brady Collection. Purchased, 1878.*
45814. The right tibia of a still smaller form ; from the Pleistocene  
of Ilford. *Brady Collection. Purchased, 1878.*
21298. The associated right calcaneum, astragalus, and naviculo-  
cuboid ; from the Pleistocene of Grays. *Purchased, 1847.*
28005. The right calcaneum ; from the Pleistocene of Clacton.  
*Presented by John Brown, Esq., 1852.*
- 23729 b. The right calcaneum ; from the Pleistocene of Slade Green.  
*Purchased, 1849.*

- 23717 b. The right calcaneum ; from the Pleistocene of Slade Green. *Purchased*, 1849.
20800. The right calcaneum ; from the Pleistocene of Grays. *Purchased*, 1847.
- 23133 a. The right calcaneum, of small size ; from the Pleistocene near Maidstone. *Purchased*, 1849.
- 21298 a. The left calcaneum, of large size ; from the Pleistocene of Grays. *Purchased*, 1847.
23128. The right astragalus ; from the Pleistocene of Ilford. *Purchased*, 1849.
21679. The right astragalus ; from the Pleistocene of Grays. *Purchased*, 1847.
- 23128 a. The right astragalus ; from the Pleistocene of Ilford. *Purchased*, 1849.
33471. The right astragalus ; no locality. *Layton Collection. Purchased*, 1858.
22036. The left astragalus, of small size ; from the Pleistocene of Grays. *Purchased*, 1849.
27946. The right naviculo-cuboid ; from the Pleistocene of Walton. *Presented by John Brown, Esq.*, 1852.
- 22036 a. The right naviculo-cuboid ; from the Pleistocene of Grays. *Purchased*, 1849.
- 20800 a. The left naviculo-cuboid ; from the Pleistocene of Grays. *Purchased*, 1847.
36415. The left naviculo-cuboid ; from the Pleistocene of Kirkcudbrightshire. Associated with the cranium No. 36405. *Presented by the Earl of Selkirk*, 1859.
21621. The left naviculo-cuboid, of small size ; from the Pleistocene of Grays. *Purchased*, 1847.
- 21298 a. The left metatarsus, of enormous size ; from the Pleistocene of Grays. *Purchased*, 1847.
23124. The right metatarsus, somewhat smaller than the last ; from the Pleistocene of Maidstone. *Purchased*, 1849.
- 23723 e-2. The left metatarsus, agreeing nearly with the last ; from the Pleistocene of Slade Green. *Purchased*, 1849.
40963. The right metatarsus, agreeing with the last ; from the Pleistocene of Crayford, Kent. *Purchased*, 1868.

- 23124 a.** The left metatarsus ; from the Pleistocene of Maidstone. This bone is of a more slender type than any of the preceding specimens. *Purchased, 1849.*
- 36416.** The right metatarsus ; from the turbary of Kirkcudbrightshire. This bone is associated with the cranium No. 36405 ; it is rather smaller than No. 23723 e-2. *Presented by the Earl of Selkirk, 1859.*
- 23723 e-3.** The left metatarsus ; from the Pleistocene of Slade Green. This bone is considerably smaller than the last. *Purchased, 1849.*
- 20016.** The left metatarsus ; from the Pleistocene of Northamptonshire. The specimen is rather stouter than the last. *Purchased, 1846.*
- 27960.** The left metatarsus ; from the Pleistocene of Clacton. This (*Fig.*) specimen is described and figured by Owen, under the name of *Bison priscus*, in the 'British Fossil Mammals and Birds,' p. 497, fig. 207. *Presented by John Brown, Esq., 1852.*
- 23723 e-4.** The right and left metatarsus ; from the Pleistocene of Slade Green. *Purchased, 1849.*
- 37127.** The right metatarsus ; from the Pleistocene of Erith. *Purchased, 1863.*
- 23124 a.** Two specimens of the left metatarsus ; from the Pleistocene of Maidstone. *Purchased, 1849.*
- 38638.** The left metatarsus of a small form ; from the Pleistocene of Moulsham, near Chelmsford, Essex. *Presented by William Roper, Esq., 1864.*
- 18304.** The left metatarsus, very similar to the last ; from Banwell Cave, Somersetshire. *McEnery Collection. Purchased, 1842.*
- 33890-33915.** The greater portion of the vertebral column ; from the Pleistocene near Herne Bay. These specimens are associated with the calvarium No. 33888. They are mentioned by Owen in the 'British Fossil Mammals and Birds,' pp. 504-5. *Presented by Wickham Flower, Esq., 1859.*
- 28020.** The atlas vertebra ; from the Pleistocene of Clacton. *Presented by John Brown, Esq., 1852.*
- 46120.** The atlas vertebra ; dredged on the Dogger Bank. *Owles Collection. Purchased, 1874.*



48046. The atlas vertebra; from the Pleistocene of Ilford.  
*Purchased, 1877.*
- 23736 e. The atlas vertebra; from the Pleistocene of Erith.  
*Purchased, 1849.*
45507. The atlas vertebra, wanting a portion of the left transverse process; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45511. The axis vertebra, wanting the left transverse process; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45512. The axis vertebra, wanting part of the neural spine and the transverse processes; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
48047. The axis vertebra; from the Pleistocene of Ilford.  
*Purchased, 1877.*
41739. The axis vertebra, apparently belonging to this form; from the turbarry of Walthamstow.  
*Purchased, 1869.*
28026. The axis vertebra; from the Pleistocene of Clacton.  
*Presented by John Brown, Esq., 1852.*
45514. The third cervical vertebra; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45515. The third cervical vertebra, wanting the neural spine; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45518. The fourth cervical vertebra; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45520. The fourth cervical vertebra, with the neural spine and transverse processes imperfect; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
41740. The fourth cervical vertebra; from the turbarry of Walthamstow.  
*Purchased, 1869.*
32408. Cast of the fourth cervical vertebra; the original from Pilling Moss, Lancashire.  
*Presented by William Turner, Esq., about 1857.*
- 27994 c. The fourth cervical vertebra; from the Pleistocene of Clacton.  
*Presented by John Brown, Esq., 1852.*

45523. The fifth cervical vertebra, imperfect; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
36408. The sixth cervical vertebra; from the turbarry of Kirkcudbrightshire. Associated with the cranium No. 36405. *Presented by the Earl of Selkirk, 1859.*
27994. The sixth cervical vertebra; from the Pleistocene of Clacton. *Presented by John Brown, Esq., 1852.*
38573. The seventh cervical vertebra; from the Pleistocene of Ilford. *Purchased, 1864.*
- 27994 a. The sixth cervical vertebra; from the Pleistocene of Clacton. *Presented by John Brown, Esq., 1852.*
- 27994 b. The seventh cervical vertebra; from the Pleistocene of Clacton. *Presented by John Brown, Esq., 1852.*
27998. An early dorsal vertebra; from the Pleistocene of Clacton. *Presented by John Brown, Esq., 1852.*
28019. An early dorsal vertebra; from the Pleistocene of Walton. *Presented by John Brown, Esq., 1852.*
46123. An early dorsal vertebra; dredged off Lowestoft, Suffolk. *Owles Collection. Purchased, 1874.*
46124. An early dorsal vertebra; dredged off Lowestoft. *Owles Collection. Purchased, 1874.*
45530. An early dorsal vertebra, nearly perfect; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
45535. A dorsal vertebra; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
45733. An early dorsal vertebra, with the neural spine imperfect; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
45544. A late dorsal vertebra; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
45545. A late dorsal vertebra; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
45546. A late dorsal vertebra; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*

46125. A late dorsal vertebra; dredged from the Dogger Bank.  
*Owles Collection. Purchased, 1874.*
45743. The last dorsal vertebra; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45552. A lumbar vertebra, with the neural spine and transverse processes imperfect; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45547. A lumbar vertebra, wanting the transverse processes; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45548. A broken lumbar vertebra; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45551. The last lumbar vertebra, wanting the transverse processes; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
45556. The last lumbar vertebra and sacrum of the same individual; from the Pleistocene of Ilford. The sacrum has five anchylosed vertebrae.  
*Brady Collection. Purchased, 1878.*
36409. The last lumbar vertebra; from the turbarry of Kirkcubrightshire; associated with the cranium No. 36405.  
*Presented by the Earl of Selkirk, 1859.*
48048. The sacrum; from the Pleistocene of Ilford.  
*Purchased, 1877.*

*Var. longifrons* (Owen<sup>1</sup>).

Syn. *Bos longifrons*, Owen<sup>2</sup>.

*Bos frontosus*, Nilsson<sup>3</sup>.

*Bison minor*, Owen<sup>4</sup> (*teste* Boyd-Dawkins).

This small form does not apparently occur in the older Pleistocene of Ilford, Grays, &c.

27506. The cranium, wanting the nasals and premaxillæ; from (Fig.) Bawdsey Bog, Suffolk. This specimen is figured by Mackie in the 'Geologist,' vol. v. pl. xv. (1862), under the name of *Bos frontosus*.  
*Purchased, 1852.*

<sup>1</sup> Rep. Brit. Assoc. for 1843, p. 235 (1844).

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Ann. Mag. Nat. Hist. ser. 2, vol. iv. p. 349 (1849).

<sup>4</sup> Brit. Foss. Mamm. and Birds, p. 497 (1846).

38524. Cranium, wanting the nasal and premaxillæ, and otherwise imperfect; from Prehistoric deposits at Lambeth, near Vauxhall Bridge. *Purchased, 1864.*
26925. Cast of the upper portion of the cranium; the original is from the Prehistoric deposits of Scandinavia. *Presented by Professor Nilsson.*
41517. The cranium of a large-sized form, wanting the right nasal; from the turbarry of Walthamstow, Essex. *Purchased, 1869.*
25588. The cranium of a cow, imperfect inferiorly; from Swaffham Fen, Norfolk. *Purchased, 1851.*
33518. The cranium of a cow; dredged from the bed of the Thames at Purfleet. *Purchased, 1858.*
36267. The cranium; from a bog near Loughgur, County Limerick, Ireland. *Presented by the Count de Salis, 1865.*
41597. The cranium of a cow; from the turbarry of Walthamstow. *Purchased, 1869.*
25589. Upper portion of the cranium; from a bog in Dunslaughlin, County Meath, Ireland. *Purchased, 1851.*
- 36433 a. Upper part of the cranium; from the Pleistocene of Walton, Essex. *Brown Collection. Presented by Sir R. Owen, K.C.B., 1859.*
- M. 1966. Upper part of the cranium of a cow; from a superficial deposit at Berry Head, Devonshire. *No history.*
41600. The left ramus of the mandible; from the turbarry of Walthamstow. This and the next two specimens are of relatively large size, thereby agreeing with the Walthamstow cranium No. 41517, and indicating that the Essex race was of large size. *Purchased, 1869.*
33923. Cranium of a hornless form; from a bog in Ireland. *Presented by Dr. Wylde.*

The Museum possesses a very large series of crania from different localities, of which the following may be briefly noticed:—25590, from Bracklesham Bay, Sussex; 25980, from the bed of the Thames at Battersea; 32736, from Jarrow, Durham (*presented by Messrs. Harrison and Hodgson, 1857*); 33917 *et seq.*, from Ireland



(*presented by Dr. Wylde*); **38128**, from Greenwich, Kent; **38129**, from Plumstead Marshes, near Woolwich, Kent (*presented by the Metropolitan Board of Works*, 1861); **40197**, from Moorfields, near Finsbury, London.

**41601.** The right ramus of the mandible; from the turbary of Walthamstow. *Purchased*, 1869.

**41602.** The right ramus of the mandible; from the turbary of Walthamstow. *Purchased*, 1869.

**7581.** The right ramus of the mandible of a smaller form, containing the three true molars; from a superficial deposit at Lewes, Sussex. *Mantell Collection. Purchased*, 1836.

**7601.** Part of the left ramus of the mandible, containing  $\overline{m. 1}$  and  $\overline{m. 2}$ ; from a superficial deposit at Herne Bay, Kent. *Mantell Collection. Purchased*, 1836.

**41598.** Part of the right ramus of the mandible of an immature individual, showing the third milk-molar; from the turbary of Walthamstow. *Purchased*, 1869.

**41598 a.** Part of the left ramus of a similar mandible; from Walthamstow. *Purchased*, 1869.

**39282.** Two specimens of the greater part of the right scapula; from a superficial deposit at Saffron Walden, Essex. *Presented by George Roberts, Esq.*, 1865.

**39283.** Two specimens of the right humerus, wanting the proximal third; from a superficial deposit at Saffron Walden. *Presented by George Roberts, Esq.*, 1865.

**33471 a.** The left radius; probably from the turbary of Happisburgh, Norfolk. *Layton Collection. Purchased*, 1858.

**41604.** The left radius; from river-silt at Walthamstow. *Purchased*, 1869.

**39284.** The left radius, wanting the distal epiphysis; from a superficial deposit at Saffron Walden. *Presented by George Roberts, Esq.*, 1865.

**39284 a.** The right radius, similarly imperfect; from Saffron Walden. *Presented by George Roberts, Esq.*, 1865.

41608. The right radius; from shell-marl above the peat at Walthamstow. *Purchased*, 1869.
28274. The left metacarpus; from a superficial deposit in Suffolk. *Purchased*, 1872
- 28274 a. The left metacarpus, of a much shorter form; from Suffolk. *Purchased*, 1872.
36455. The left metacarpus, very similar to the last; from the turbary of Peckham, Surrey. *Purchased*, 1862.
39287. Two specimens of the left tibia; from a superficial deposit at Saffron Walden. *Presented by George Roberts, Esq.*, 1865.
- 39287 a. The right tibia, imperfect superiorly; from Saffron Walden. *Presented by George Roberts, Esq.*, 1865.
41605. The right metatarsus; from river-silt at Walthamstow. *Purchased*, 1869.
41543. The right metatarsus of a smaller form; from the turbary of Walthamstow. *Purchased*, 1869.
- 41543 a. The right metatarsus, rather smaller than the last; from the turbary of Walthamstow. *Purchased*, 1869.
41544. The right metatarsus of a calf, wanting the distal epiphysis; from the turbary of Walthamstow. *Purchased*, 1869.
- 18164-69. The greater portion of the vertebral column; from an Irish bog. *Purchased*.

**Bos elatus**, Pomel<sup>1</sup> (*ex* Croizet, MS.).

Syn. *Bos elaphus*, Pomel<sup>2</sup>.

*Bos etruscus*, Falconer<sup>3</sup>.

Rütimeyer ('Die Rinder der Tertiär-Epoche' [Abh. schweiz. pal. Ges. vol. v.], p. 156) identifies the typical French form with the Italian *Bos etruscus*, of which he figures a fine skull preserved in the Museum at Florence, which is reproduced in the accompanying woodcut (fig. 2, p. 20).

<sup>1</sup> 'Catalogue Méthodique,' p. 114 (1853).

<sup>2</sup> *Loc. cit.*

<sup>3</sup> In Falconer's 'Palæontological Memoirs,' vol. ii. p. 481 (1868).

The species is considered to be closely allied to the existing Malayan *Bos sondaicus*. The horn-cores are set low down on the

Fig. 2.



*Bos elatus*. Skull; from the Upper Pliocene of the Val d'Arno, Italy.  
Florence Museum. (From the Abh. schweiz. pal. Ges.)

frontals, far below the plane of the occiput; the limb-bones are relatively slender; and the lower molars have an accessory column at the middle of their inner surface.

*Hab.* France and Italy.

46259. Upper molars; from the Upper Pliocene of Ardè (Puy-de-Dôme), France. The specific reference is provisional.  
*Bravard Collection. Purchased, 1852.*
27640. The hinder portion of the left ramus of the mandible of a large specimen; from the Upper Pliocene of Perrier, near Issoire (Puy-de-Dôme). In this and the last specimen the small accessory column in the middle of the inner surface of the true molars is very distinct. Both specimens are noticed by Rüttimeyer, *op. cit.* p. 156.  
*Croizet Collection. Purchased, 1848.*
27641. The greater part of the right ramus of the mandible, showing all the cheek-teeth except  $\overline{\text{pm. 2}}$ ; from the Upper Pliocene of Perrier. *Croizet Collection. Purchased, 1848.*
27642. The greater part of the left ramus of the mandible, showing all the cheek-teeth except  $\overline{\text{pm. 2}}$ , in a well-worn condition; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
27618. The right metacarpus; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
29665. The right metacarpus; probably from the same locality.  
*Hastings Collection. Purchased, 1855.*
- 27618 a. The right metatarsus; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*

*Some of the following specimens may belong to this species.*

46939. Part of the left ramus of the mandible of a small species of *Bos*; from the Upper Pliocene of Ardè. There is no accessory outer column to the true molars, and Rüttimeyer (*loc. cit.*) doubts if the specimen belongs to *B. elatus*.  
*Bravard Collection. Purchased, 1852*
- 27641 a. The proximal portion of the left radius and ulna, wanting the olecranon; from the Upper Pliocene of Ardè.  
*Croizet Collection. Purchased, 1848.*
28825. The left metatarsus; from the Upper Pliocene of the Val d'Arno, Italy. *Presented by J. B. Pentland, Esq., 1856.*



***Bos namadicus*, Falconer<sup>1</sup>.**

This species is allied to *Bos taurus*, but there is a difference in the curvature of the horn-cores, and the occipital surface is more deeply incised by the extremities of the temporal fossæ, showing indications of affinity with the living Indian *B. gaurus* and *B. frontalis*; the vertex of the occiput is also markedly convex, indicating another approach to the former species.

*Hab.* India.

*All the specimens are from the Pleistocene of the Narbada Valley, and, unless otherwise stated, were presented by C. Fraser, Esq., before 1843.*

- 39758.** The greater portion of the cranium, wanting the horn-cores (Fig.) and the extremity of the muzzle. This specimen is figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxii. fig. 5, and in (unpublished) plate G. fig. 2 of the 'Fauna Antiqua Sivalensis.' It agrees precisely with a nearly perfect specimen in the Indian Museum, Calcutta, figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pls. xi., xvi. fig. 1.
- 39760.** The frontlet, with a considerable portion of the right horn-core. This specimen is figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxii. fig. 4, and in (unpublished) plate G. fig. 1 of the 'Fauna Antiqua Sivalensis.'
- 39365.** The hinder portion of the cranium, showing the three true molars.
- 39758 a.** Base of a right horn-core, of enormous size.
- 36864.** The distal two thirds of the right radius of a smaller form.
- 36671.** The left metacarpus; from Bihna, near Jabalpúr, Narbada Valley. This specimen agrees very closely with the metacarpus of *Bos taurus*, var. *primigenius*, No. 36412.  
*Presented by the Secretary of State for India, 1860.*
- 36865.** The left metacarpus, of shorter form than the last.
- 36865 a.** The proximal extremity of the right femur.
- 36865 b.** The proximal extremity of the left femur.

<sup>1</sup> 'Catalogue of Fossil Vertebrata of Asiatic Society of Bengal,' p. 232 (1859).

36865 c. The distal extremity of the right femur, of enormous size.

36865 d. The proximal extremity of the right tibia.

36866. The centrum of the axis vertebra.

36866 a. The fifth cervical vertebra.

36872. Bones of the foot.

The following specimens are merely provisionally referred to this form; some of them may belong to *Bubalus buffelus*, var. *pakindicus*, or to the so-called *Bos palæogaurus*.

36844. The right ramus of the mandible of an immature individual.

This and the two next specimens are larger and deeper than the mandible of the Ilford race of *B. taurus*, var. *primigenius*.

36845. Part of the right ramus of the mandible, containing the six cheek-teeth.

36848. Part of the right ramus of the mandible, containing the last five cheek-teeth ( $\overline{m.1}$  broken); from Bihna, Narbada Valley.

36846. The left ramus of the mandible of a smaller form, containing the last four cheek-teeth.

36847. The anterior part of the right ramus of the mandible.

36874. The right humerus.

36863. The left radius and ulna, wanting the olecranon. This and the last specimen are rather smaller than the average of the corresponding bones of the Ilford Ox.

36863 a. The proximal extremity of the left radius.

### ***Bos palæogaurus*, Rüttimeyer<sup>1</sup> (ex Falc. MS.).**

This provisional species is founded on the palate noticed below, which, according to Rüttimeyer, is indistinguishable from that of the existing *B. gaurus*; the specimen is perhaps insufficient for specific determination.

*Hab.* India.

<sup>1</sup> 'Die Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vol. v.) p. 154 (1878).

- 33672.** The hinder part of the palate, containing the three true molars on both sides, and pm. 4 on the left side; from the Pleistocene of the Narbada Valley, India. This specimen is the type, and is noticed by Rüttimeyer in the passage cited. *Presented by C. Fraser, Esq. Before 1843.*

**Bos** (?), sp.

*Hab.* England.

- 45989.** A right upper true molar of a bovine animal; from the Red Crag of Felixstow, Suffolk. *Purchased, 1874.*

Genus **BISON**, Hamilton Smith<sup>1</sup>.

**Bison bonasus** (Linn.<sup>2</sup>).

Syn. *Bos bonasus*, Linn.<sup>3</sup>  
*Bison europæus*, Auct.

*Hab.* Europe and (Pleistocene) Arctic America.

Var. *priscus* (Bojanus<sup>4</sup>).

Syn. *Urus priscus*, Bojanus<sup>5</sup>.  
*Bison priscus*, Auct.

In the typical forms of this race the horns are larger and less curved than in the living Aurochs; but the fossil specimens in the Museum seem to indicate a complete transition in this respect, and some of them cannot be distinguished from the living race.

- 45392.** The calvarium and horn-cores of a very large bull; from the Pleistocene of Ilford, Essex. The width of the frontals between the horn-cores is 0,375, the length of the left horn-core 0,375, and its greatest diameter 0,140.

*Brady Collection. Purchased, 1878.*

- 45849.** Calvarium and horn-cores; from the Pleistocene of Erith, Kent. *Purchased, 1878.*

- M. 2243.** Calvarium and horn-cores; from a Pleistocene deposit, locality unknown. This specimen is also No. 1 of the 'Old Catalogue.' *Sloane Collection.*

<sup>1</sup> In Griffith's 'Animal Kingdom,' vol. v. p. 373 (1827).

<sup>2</sup> Syst. Nat. ed. 12, vol. i. p. 99 (1766), *Bos*.

<sup>3</sup> *Loc. cit.*

<sup>4</sup> Nova Acta Ac. Cæs. Leop.-Car. vol. xiii. pt. 2, p. 427 (1827). *Urus*.

<sup>5</sup> *Loc. cit.*

40410. Calvarium and horn-cores; from the Pleistocene of Peckham, Surrey. *Purchased. Before 1866.*
35576. Calvarium and horn-cores; from the Pleistocene (?) of Lincolnshire. In this and the last specimens the horn-cores are very small, and seem indistinguishable from those of the existing race.  
*Presented by Earl Fortescue (then Viscount Ebrington), 1859.*
32841. Occipital portion of the cranium; from the Pleistocene of Ilford, Essex. *No history.*
- M. 2244. The left horn-core, of large size; from the Pleistocene of Walton, Essex. *Presented by C. B. Greenough, Esq.*
40703. The left horn-core, of small size; dredged off the coast of Essex. *Purchased, 1867.*
46445. The left horn-core; from the Pleistocene of Westbury, Wiltshire. *Purchased, 1875.*
45393. The left horn-core and part of the frontal, probably belonging to a cow; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*

*The following specimens were obtained from regions almost within the present range of *Bison americanus*, which now extends northward as far as the 63rd or 64th parallel. Since, however, the fossil crania agree precisely with European specimens, and those from Kotzebue Sound were obtained in company with remains of *Elephas primigenius* and *Ovibos moschatus*, there seems every reason for referring them to the present species.*

44063. The calvarium and the right horn-core; from a Pleistocene deposit on the Upper Porcupine river, Canada (about lat. 67°). *Presented by the Rev. Robert McDonald, 1873.*
- 1 a (O.C.). The calvarium and horn-cores; from a frozen Pleistocene (Fig.) deposit in Eschscholtz Bay, Kotzebue Sound, Alaska (lat. 66° 30'). This specimen is figured in F. W. Beechey's 'Voyage to the Pacific and Behring's Straits in H.M.S. 'Blossom' during the years 1825 to 1828,' vol. ii. p. 393 pl. iii. (Fossils), fig. 1 (1831).  
*Presented by Captain F. W. Beechey, R.N.*
- 24589, 24589 a. Calvaria and horn-cores; from the above-mentioned deposit in Eschscholtz Bay.  
*Presented by Captain Kellet and Lieut. Wood, R.N., 1850.*



**19 (O. C.).** A horn ; from the Pleistocene of Eschscholtz Bay. This (Fig.) specimen is figured in Beechey's 'Voyage,' vol. ii. pl. iii. fig. 2. *Presented by Captain F. W. Beechey, R.N.*

**44064-5.** Two fragments of the mandible ; from the Pleistocene of the Porcupine River.

*Presented by Rev. Robert McDonald, 1873.*

**17 (O. C.).** The right humerus ; from the Pleistocene of Kotzebue (Fig.) Sound. Figured in Beechey's 'Voyage,' vol. ii. pl. iii. fig. 6. *Presented by Captain F. W. Beechey, R.N.*

**44069.** The left metacarpus ; from the Pleistocene of the Porcupine River. *Presented by Rev. Robert McDonald, 1873.*

**9 a (O. C.).** The left metacarpus ; from the Pleistocene of Kotzebue (Fig.) Sound. Figured in Beechey's 'Voyage,' vol. ii. pl. iii. fig. 7. *Presented by Captain F. W. Beechey, R.N.*

**24576.** The proximal two thirds of the right metacarpus of a young individual ; from the Pleistocene of Kotzebue Sound.

*Presented by Capt. Kellet and Lieut. Wood, R.N., 1850.*

**24576 c.** The right tibia ; from the Pleistocene of Kotzebue Sound.

*Presented by Capt. Kellet and Lieut. Wood, R.N., 1850.*

**14 (O. C.).** The left tibia ; from the Pleistocene of Kotzebue Sound. (Fig.) Figured in Beechey's 'Voyage,' vol. ii. pl. iii. fig. 4.

*Presented by Captain F. W. Beechey, R.N.*

**14 a (O. C.).** The right tibia ; from the Pleistocene of Kotzebue Sound. Figured in Beechey's 'Voyage,' vol. ii. pl. iii. fig. 12. *Presented by Captain F. W. Beechey, R.N.*

**9 b (O. C.).** The left metatarsus ; from the Pleistocene of Kotzebue (Fig.) Sound. Figured in Beechey's 'Voyage,' vol. ii. pl. iii. fig. 5. *Presented by Captain F. W. Beechey, R.N.*

**24576 a.** The right metatarsus ; from the Pleistocene of Kotzebue Sound.

*Presented by Capt. Kellet and Lieut. Wood, R.N., 1850.*

**24576 b.** The atlas vertebra ; from the Pleistocene of Kotzebue Sound.

*Presented by Capt. Kellet and Lieut. Wood, R.N., 1850.*

**44068.** An imperfect dorsal vertebra ; from the Pleistocene of the Porcupine River.

*Presented by Rev. Robert McDonald, 1873.*

44066-8 a. Three portions of the vertebral column; from the Pleistocene of the Porcupine River.

*Presented by Rev. Robert McDonald, 1873.*

**Bison latifrons** (Harlan<sup>1</sup>).

Syn. *Bos latifrons*, Harlan<sup>2</sup>.

This species appears to be very closely related to *Bison americanus*, but is of larger size, with relatively stouter horn-cores, which are less inclined backwards. It is referred to the present genus by Leidy in the 'Proc. Ac. Nat. Sci. Philad.' vol. vi. p. 117 (1852, volume dated 1854).

*Hab.* North America.

20706. The calvarium and horn-cores; from the Pleistocene of the (Fig.) Brazos River, near San Felipe d'Austin, Texas. This specimen is described and figured by W. M. Carpenter in the 'Amer. Journ.' ser. 2, vol. i. p. 245, fig. 1 (1846); and is noticed in 'Falconer's Palæontological Memoirs,' vol. ii. p. 223. *Purchased, 1847.*

40847. Fragment of the right ramus of a mandible, probably belonging to the present species; from the Pleistocene of Big-Bone Lick, Kentucky, U. S. A.

*Presented by C. Falconer, Esq., 1867.*

Genus **BUBALUS**, Hamilton-Smith<sup>3</sup>.

Including :—*Anoa*, Hamilton-Smith<sup>4</sup>.

*Probubalus*, Rüttimeyer<sup>5</sup>.

*Hemibos*, Falconer and Cautley<sup>6</sup>.

*Amphibos*, Falconer and Cautley<sup>7</sup>.

*Peribos*, Lydekker<sup>8</sup>.

The writer follows Flower in including *Anoa* in the present genus. The genus *Probubalus* was formed by Rüttimeyer for the reception of the latter and the two extinct species here named

<sup>1</sup> 'Fauna Americana,' p. 273 (1825), *Bos*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> In Griffith's 'Animal Kingdom,' vol. v. p. 371 (1827). As a subgenus.

<sup>4</sup> *Loc. cit.* p. 293.

<sup>5</sup> Denkschr. schw. Ges. Nat. vol. xxii. art. 3, p. 52 (1867).

<sup>6</sup> In 'Falconer's Palæontological Memoirs,' vol. i. p. 546 (1868).

<sup>7</sup> *Ibid.* p. 547.

<sup>8</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. 141 (1878).

*Bubalus occipitalis* and *B. acuticornis*; it is manifest, however, that the name *Anoa* should have been employed, and *Probubalus* has therefore no right to stand. *Hemibos* was assigned by Falconer and Cautley to the two species here named *B. occipitalis* and *B. antilopinus*, and if these (together with *B. acuticornis*) are regarded as generically distinct from *Anoa*, that name may still be applied to them. Flower's view of the generic unity of *Anoa* and *Bubalus* leads, however, to the conclusion that *Hemibos* should likewise be included in the latter. The upper true molars of *B. depressicornis* are narrow, and, at least very frequently, lack the inner accessory column. Those of the allied fossil forms are squared, and have a large accessory column.

***Bubalus buffelus* (Blumenbach<sup>1</sup>).**

Syn. *Bos bubalus*, Linn.<sup>2</sup>

*Bos buffelus*, Blumenbach<sup>3</sup>.

The Pleistocene Indian form cannot be regarded as more than a large variety of this species.

*Hab.* India.

Var. *palæindicus* (Falconer<sup>4</sup>).

Syn. *Bos palæindicus*, Falconer<sup>5</sup>.

**39715.** The cranium, with the horn-cores nearly complete; from (Fig.) the Pleistocene of the Narbada Valley, India. This specimen is figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxii. fig 1, and in (unpublished) plate G. figs. 6, 7 of the 'Fauna Antiqua Sivalensis' (premaxillæ and horn-core only); it is of comparatively small size.

*Presented by C. Fraser, Esq. Before 1843.*

**39759.** The cranium, imperfect inferiorly, and wanting the whole of (Fig.) the left, and half of the right horn-core; from the Pleistocene of the Narbada Valley. This specimen is figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxii. fig. 2, and in the 'Fauna Antiqua Sivalensis' (unpublished) plate G. fig. 5.

*Presented by C. Fraser, Esq. Before 1843.*

**39716.** Calvarium and a portion of the right horn-core; from the Pleistocene of the Narbada Valley. This specimen is

<sup>1</sup> 'Handbuch der Naturgeschichte,' ed. 10, p. 121 (1821, *teste* Fischer), *Bos*.

<sup>2</sup> Syst. Nat. ed. 12, vol. i. p. 99 (1766).

<sup>3</sup> *Loc. cit.*

<sup>4</sup> 'Catalogue of Fossil Vertebrata of Asiatic Society of Bengal,' p. 230 (1859), *Bos*.

<sup>5</sup> *Loc. cit.*

figured in the 'Fauna Antiqua Sivalensis,' *op. cit.* fig. 3 ; it is larger than either of the preceding specimens, but smaller than the gigantic skull figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pl. xix. (1878). *Presented by C. Fraser, Esq. Before 1843.*

**39717.** The calvarium ; from the Pleistocene of the Narbada Valley. (*Fig.*) This specimen is figured in the 'Fauna Antiqua Sivalensis,' *op. cit.* fig. 4. *Presented by C. Fraser, Esq. Before 1843.*

**17142.** Hinder portion of the cranium, with half of the left horn-cores ; from the Pleistocene of the Narbada Valley.  
*Presented by C. Fraser, Esq. Before 1843.*

**17143.** The hinder portion of the cranium, with the bases of the horn-cores ; from the Pleistocene of the Narbada Valley.  
*Presented by the Secretary of State for India, 1860.*

### **Bubalus antiquus, Duvernoy<sup>1</sup>.**

This species is allied to the living African Buffaloes.

*Hab.* Africa.

**M. 2246.** Cast of the calvarium and portions of the horn-cores. The original of this specimen was obtained from the Pleistocene of Setif, Algeria ; it is figured by P. Gervais in the 'Zoologie et Paléontologie Générales,' ser. 1, pl. xix. fig. 6. *No history.*

### **Bubalus platyceros, Lydekker<sup>2</sup>.**

*Syn. Bubalus sivalensis, Rüttimeyer<sup>3</sup>.*

This is a very distinct form, in some respects intermediate between *B. buffelus* and *B. occipitalis*.

*Hab.* India.

**16431.** The calvarium and horn-cores ; from the Pliocene of the Siwalik Hills, India. This specimen is described and figured by Rüttimeyer, *op. cit.* p. 138, pl. ii. figs. 4, 5 ; it is rather smaller than the type specimen figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pl. xviii. (1878), but is otherwise similar.

*Cautley Collection. Presented, 1842.*

<sup>1</sup> *Comptes Rendus*, vol. xxxiii. p. 595 (1851).

<sup>2</sup> *Rec. Geol. Surv. Ind.* vol. x. p. 31 (1877).

<sup>3</sup> 'Die Rinder der Tertiär-Epoche' (*Abh. schweiz. pal. Ges.* vol. v.), p. 138 (1878).



- 16431 a. Cast of the calvarium and part of the horn-cores. The original of this specimen is from the Siwalik Hills; but it is not known where it is preserved. *No history.*

**Bubalus occipitalis** (Falconer<sup>1</sup>).

Syn. *Bubalus triquetricornis*, Rütimeyer<sup>2</sup>.

*Probubalus sivalensis*, Rütimeyer<sup>3</sup>.

*Bos occipitalis*, Falconer<sup>4</sup>.

*Hemibos triquetriceros*, Falconer and Cautley<sup>5</sup>.

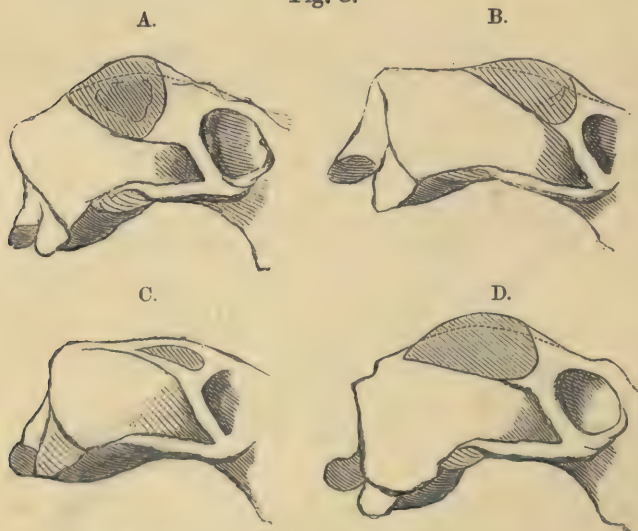
*Peribos occipitalis*, Lydekker<sup>6</sup>.

*Probubalus triquetricornis*, Rütimeyer<sup>7</sup>.

*Hemibos occipitalis*, Lydekker<sup>8</sup>.

The specific name *occipitalis* has been substituted for *triquetricornis*, because the latter is equally applicable to *B. acuticornis*.

Fig. 3.



*Bubalus occipitalis*. The hinder part of the cranium of the four varieties: A, normal; B, trochoceros; C, hornless; D, spoceros race. (From the Abh. schweiz. pal. Ges.)

<sup>1</sup> 'Falconer's Palæontological Memoirs,' vol. i. p. 280 (1868), *Bos*.

<sup>2</sup> Denkschr. schw. Ges. Nat. vol. xxii. art. 3, p. 23 (1867).

<sup>3</sup> *Ibid.* p. 52.

<sup>4</sup> *Loc. cit.*

<sup>5</sup> 'In Falconer's Palæontological Memoirs,' vol. i. p. 546 (1868).

<sup>6</sup> Palæontologica Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. 141 (1878).

<sup>7</sup> 'Die Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vol. v.), p. 122 (1878).

<sup>8</sup> *Loc. cit.* p. 174 (1880).

The species exhibits a great amount of variation in cranial characters, even in the same sex. In the normal form (fig. 3, A) the horn-cores of the males are triangular, with a sharp ridge anteriorly; in the trochoceros form (fig. 3, B) they have a pear-shaped section, and recede very rapidly from the forehead; in the third or æpoceros form (fig. 3, D) they are more upright; whilst in a fourth (fig. 3, C) the horns are entirely wanting. A large series of crania are figured by Rütimeyer in the 'Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vols. iv. and v. [1877-1878]), and by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pls. xx. to xxiv.

*Hab.* India.

All the following specimens are from the Pliocene of the Siwalik Hills, and, unless otherwise stated, belong to the *Cautley Collection*, Presented, 1842:—

**16411.** The greater part of the cranium of a male of the normal form, with part of the right horn-core, which has a triangular cross section. This specimen is noticed by Rütimeyer in the 'Rinder der Tertiär-Epoche,' p. 127, and is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis' (unpublished) plate H. figs. 2, 2a.

**39565.** The cranium of a male of the normal form, with the base of the right horn-core. This specimen is described and figured by Rütimeyer, *op. cit.* p. 122, pl. vii. figs. 1, 2 (as No. 39563).

**23109.** Lower portion of the cranium of a male. This specimen is described and figured by Rütimeyer, *op. cit.* p. 127, pl. iv. figs. 1, 2. *Presented by Col. Colvin.*

**36665.** Part of the calvarium of a male of the trochoceros form. This specimen is described and figured by Rütimeyer, *op. cit.* p. 129, pl. i. figs. 3, 4. The horn-cores have a pyriform section; and the specimen agrees very closely with the more perfect skull, which is the type of Falconer's *Bos occipitalis*, figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pl. xx.

**48031.** Calvarium and part of the horn-cores of a male of the trochoceros form. This specimen is described and figured by Rütimeyer, *op. cit.* p. 131, pl. vi. fig. 11.

**48028.** Calvarium and the base of the right horn-core of a male of the trochoceros form. Noticed by Rütimeyer, *op. cit.* p. 129. *Presented by Dr. H. Falconer.*

48017. The greater portion of the cranium of a male of the æpyceros form. Noticed by Rüttimeyer, *op. cit.* p. 128.
48023. The greater portion of the cranium, with the base of the right horn-core, of a male of the æpyceros form. This specimen is noticed by Rüttimeyer, *op. cit.* p. 128.
48027. The calvarium, with the greater portion of the left horn-core, of a male of the æpyceros form. Noticed by Rüttimeyer, *op. cit.* p. 128. *Presented by Dr. H. Falconer.*
40886. The nearly complete cranium of a male of the æpyceros form, showing half of the right horn-core, but wanting the nasals. *Presented by C. Falconer, Esq., 1867.*
39557. The upper portion of the cranium of a male of the æpyceros form, with the base of the right horn-core. *Presented by Dr. H. Falconer.*
39584. The nearly complete cranium of a male, with part of the left horn-core. This specimen is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis' (unpublished) plate H. figs. 1, 1a.
48021. The middle portion of the cranium of a male.
48025. Calvarium and part of the left horn-core of a male.
48024. Calvarium of a male. This specimen is noticed by Rüttimeyer, *op. cit.* p. 127.
36676. Middle portion of the cranium of a male, showing the cheek-dentition. Noticed by Rüttimeyer, *op. cit.* p. 127.
39563. The middle portion of a cranium.
48032. Calvarium, with base of the left horn-core.
48030. Calvarium, with a part of the left horn-core, of a male of the trochoceros form.
17138. The nearly perfect cranium of a male of the normal form, showing half of the left horn-core.
17139. The cranium of a male, with the horn-cores broken off, agreeing in character with No. 23109.
48033. Calvarium of the hornless form. This specimen is described (*Fig.*) and figured by Rüttimeyer, *op. cit.* p. 132, pl. ii. figs. 1-3.
16173. The cranium (imperfect inferiorly) of a female. This specimen is described and figured by Rüttimeyer, *op. cit.* p. 122, pl. i. figs. 1, 2.

39588. Cranium of a young individual. This specimen is described by Rüttimeyer, *op. cit.* p. 126.
36666. The upper portion of the cranium of a female. Noticed by Rüttimeyer, *op. cit.* p. 129.
36675. The middle portion of the cranium of a female. Noticed by Rüttimeyer, *op. cit.* p. 126.
39561. The nearly complete cranium of a female, without the horn-cores. Noticed by Rüttimeyer, *op. cit.* p. 126.

**Bubalus acuticornis**, Rüttimeyer<sup>1</sup> (*ex* Falc. & Caut., MS.).

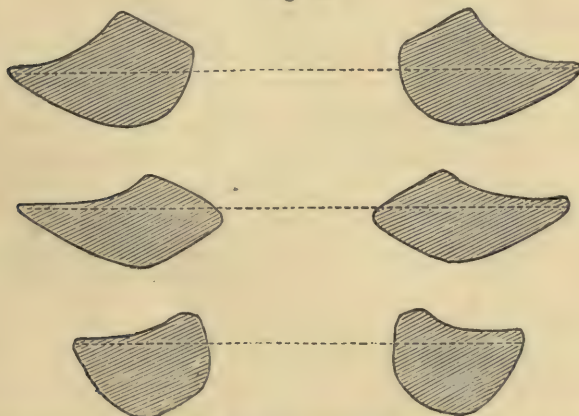
Syn. *Probubalus acuticornis*, Rüttimeyer<sup>2</sup>.

*Amphibos acuticornis*, Falconer and Cautley<sup>3</sup>.

*Hemibos acuticornis*, Lydekker<sup>4</sup>.

In this species the cranium is narrower than in *B. occipitalis*, and its greatest width is at the orbits, which are less protuberant, and

Fig. 4.



*Bubalus acuticornis*.—Section of base of horn-cores in three varieties of the male,  
(From the Abh. schweiz. pal. Ges.)

more approximated to the horn-cores than in the latter; the frontals are concave between the horn-cores. The horn-cores are more slender, more upright, and diverge to a smaller extent; they are

<sup>1</sup> Denkschr. schw. Ges. Nat. vol. xxii. art. 3, p. 29 (1867).

<sup>2</sup> *Ibid.* p. 52.

<sup>3</sup> In 'Falconer's Palæontological Memoirs,' vol. i. p. 547 (1868).

<sup>4</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. 176 (1880).



usually triangular in section, and their posterior angle, as in all Buffaloes, is strongly marked, although the anterior is frequently less distinct. In the female and young the horn-cores are sub-cylindrical. The accompanying woodcut (fig. 4) shows the variation in the form of the section of the horn-cores.

*Hab.* India.

All the following specimens are from the Pliocene of the Siwalik Hills, and, unless otherwise stated, belong to the *Cautley Collection*, *Presented*, 1842 :—

**39560.** The calvarium and horn-cores of a male. This specimen is (*Fig.*) described and figured by Rüttimeyer in the 'Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vol. v.), p. 147, pl. iii. figs. 1, 2, and is also figured in the 'Fauna Antiqua Sivalensis' (unpublished), plate i. figs. 2, 2a.

**39585.** The greater portion of the cranium of a male, with part of (*Fig.*) the left horn-core. This specimen is described and figured by Rüttimeyer, *op. cit.* p. 151, pl. iii. fig. 7.

**48014.** The upper portion of the cranium of a male, with the base of the right horn-core. Noticed by Rüttimeyer, *op. cit.* p. 151.

**48022.** The greater part of the cranium of a male, with the base of the horn-cores. Noticed by Rüttimeyer, *op. cit.* p. 151.

**48015.** The calvarium and part of the horn-cores.

**48020.** Hinder portion of the cranium of a male, with the base of the right horn-core. Noticed by Rüttimeyer, *op. cit.* p. 151.

**48019.** Hinder portion of the cranium, with the horn-cores broken off.

**17555.** The cranium, with the mandible attached, of a female. Noticed by Rüttimeyer, *op. cit.* p. 151.

**48019 a.** The hinder portion of a cranium, with a fragment of the left horn-core.

**48019 b.** The greater portion of a damaged cranium, without the horn-cores.

**48019 c.** The hinder portion of a cranium, with part of the horn-cores, probably belonging to a young individual.

17140. The cranium of a male, with the greater part of the left horn-core. This specimen shows very clearly the characteristic intercornual concavity of the frontals.
39564. The greater portion of the cranium of a female, showing the (Fig.) base of the horn-cores. This specimen is described and figured by Rüttimeyer, *op. cit.* p. 151, pl. iii. figs. 3-5; a very similar example is figured by the present writer, *op. cit.* pl. xxi. fig. 1, and pl. xxi. b.
48016. Calvarium, with the bases of the horn-cores, of a young (Fig.) individual. Rüttimeyer (*op. cit.* p. 150, pl. iii. fig. 6) describes and figures this specimen.
48018. Part of the cranium of a young individual. Noticed by Rüttimeyer, *op. cit.* p. 150.
39562. The anterior portion of the cranium, in a much-crushed condition. Noticed by Rüttimeyer, *op. cit.* p. 151.

**Bubalus antilopinus** (Falconer and Cautley<sup>1</sup>).

Syn. *Amphibos antilopinus*, Falconer and Cautley<sup>2</sup>.

*Probubalus antilopinus*, Rüttimeyer<sup>3</sup>.

*Hemibos antilopinus*, Lydekker<sup>4</sup>.

This species is probably a less specialized form of the *B. occipitalis* stock; it is readily recognized by its subcylindrical horn-cores (recalling those of the female of that species), which are closely approximated at their roots, and by the extreme breadth of the lower portion of the skull.

*Hab.* India.

39586. The cranium (imperfect inferiorly), with part of the horn-cores; from the Pliocene of the Siwalik Hills. This is the type specimen, and is described and figured by Rüttimeyer, *op. cit.* p. 135, pl. i. figs. 5, 6.

*Cautley Collection. Presented, 1842.*

- 40886 a. Greater portion of the cranium; from the Pliocene of the Siwalik Hills. Rüttimeyer, *op. cit.* p. 136, notices this specimen.

*Cautley Collection. Presented, 1842.*

<sup>1</sup> In 'Falconer's Palæontological Memoirs,' vol. i. p. 547 (1868), *Amphibos*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> 'Die Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vol. v.), p. 135 (1878).

<sup>4</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. 178 (1880).

- 40886 b. The greater portion of the cranium, showing the base of the horn-cores; from the Pliocene of the Siwalik Hills. This specimen agrees precisely with the last.

*Cautley Collection. Presented, 1842.*

Genus **LEPTOBOS**, Rütimeyer<sup>1</sup> (*ex Falc.*, MS.).

This genus, of which representatives occur in the Siwaliks, Narbadas, and the Val d'Arno beds, comprises bovine animals presenting strong indications of affinity with *Boselaphus*. The frontal portion of the skull is very wide, with widely-separated, subcylindrical horn-cores, placed far below the level of the occiput; the parietal border of the occiput is strongly ridged. The horn-cores are sometimes absent.

**Leptobos falconeri**, Rütimeyer<sup>2</sup>.

*Hab.* India.

40887. The cranium, with the bases of the horn-cores; from the (Fig.) Pliocene of the Siwalik Hills, India. This specimen (with the next) is the type, and is described and figured by Rüti-

Fig. 5.



*Leptobos falconeri*.—Upper part of cranium. (From the Abh. schweiz. pal. Ges.)

meyer, *op. cit.* p. 159, pl. i. figs. 7, 8. The accompanying woodcut (fig. 5) shows the upper part of this cranium.

*Presented by C. Falconer, Esq., 1867.*

<sup>1</sup> 'Die Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vol. v.), p. 157 (1878).

<sup>2</sup> *Loc. cit.*

- 39567.** The cranium (imperfect inferiorly), showing the base of the  
(*Fig.*) right horn-core; from the Pliocene of the Siwalik Hills.  
This specimen is described and figured by Rüttimeyer, *op. cit.* p. 159, pl. iv. figs. 3, 4.

*Cautley Collection. Presented, 1842*

- 39566.** The greater portion of the cranium, with the base of the  
left horn-core; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

- 48026.** The upper portion of the cranium, showing the base of the  
horn-cores; from the Pliocene of the Siwalik Hills. This  
specimen is noticed by Rüttimeyer, *op. cit.* p. 157.

*Cautley Collection. Presented, 1842.*

- 17141.** The greater portion of the cranium of a male, with the half  
of the right horn-core; from the Pliocene of the Siwalik  
Hills. This specimen agrees very closely with No. 40887.

*Cautley Collection. Presented, 1842.*

- 48037.** Cranium of the hornless (? female) form; from the Pliocene  
(*Fig.*) of the Siwalik Hills. Described and figured by Rüttimeyer,  
*op. cit.* p. 162, pl. iv. figs. 5, 6, pl. vi. fig. 9.

*Cautley Collection. Presented, 1842.*

### **Leptobos fraseri**, Rüttimeyer<sup>1</sup>.

This species approaches much nearer to the living Indian wild  
oxen.

*Hab.* India.

- 39714.** Cranium of the hornless form; from the Pleistocene of the  
(*Fig.*) Narbada Valley, India. This specimen is the type, and is  
described and figured by Rüttimeyer, *op. cit.* p. 165, pl. vii.  
figs. 11, 12. *Presented by C. Fraser, Esq. Before 1843.*

*Specimens probably belonging either to Bubalus or Leptobos;  
from the Pliocene of the Siwalik Hills.*

(The specimens belong to the *Cautley Collection*, unless otherwise  
stated.)

- 48035.** Lower portion of a cranium.

- 48035 a.** Middle portion of a cranium.

- 48035 b.** The extremity of the muzzle.

<sup>1</sup> 'Die Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vol. v.), p. 165  
(1878). *Errorim, fraseri*.



- 48035 c. The greater portion of a much broken cranium.
36667. The greater portion of a much damaged cranium, with the hinder part of the mandible attached.  
*Presented by the Secretary of State for India, 1860.*
39706. The greater part of a mandible.
39589. The right ramus of a mandible, with the six cheek-teeth.
- 39589 a. Part of the right ramus of a mandible of an immature individual.
- 39589 b. The greater part of the right ramus of a mandible, showing all the cheek-teeth except pm. 1.
36678. The hinder part of the left ramus of a mandible, containing the four last cheek-teeth.
- 36678 a. The hinder part of the right ramus of a mandible, with the four last cheek-teeth.
- 36678 b. The greater part of the left ramus of a mandible, with the six cheek-teeth.
16625. The anterior part of the left ramus of a mandible, with the last two premolars and the first two true molars.
16626. Fragment of the right maxilla, containing the three true molars.
- 16626 a. Fragment of the right maxilla, containing m. 2 and m. 3, the grinding-surfaces of which have been cut and polished.
36670. A left humerus.

*Presented by the Secretary of State for India, 1860*

Genus **OVIPOS**, Blainville<sup>1</sup>.

Syn. *Bootherium*, Leidy<sup>2</sup>.

*Ovibos moschatus* (Zimmermann<sup>3</sup>).

Syn. *Bos moschatus*, Zimmermann<sup>4</sup>.

*Bos pallasi*, De Kay<sup>5</sup>.

*Ovibos pallasi*, Blainville<sup>6</sup>.

*Bubalus moschatus*, Owen<sup>7</sup>.

*Hab.* Arctic Regions (Recent) and Northern Europe (Pleistocene).

<sup>1</sup> Bull. Soc. Philom. Paris, 1816, p. 76.

<sup>2</sup> Proc. Ac. Nat. Sci. Philad. vol. vi. p. 71 (1852; vol. dated 1854).

<sup>3</sup> Geograph. Geschichte, vol. ii. p. 86 (1780), *Bos*.

<sup>4</sup> *Loc. cit.*

<sup>5</sup> Ann. Lyc. New York, vol. ii. p. 291 (1828).

<sup>6</sup> *Teste* Owen.

<sup>7</sup> Quart. Journ. Geol. Soc. vol. xii. p. 124 (1856).

**M. 2247.** Hinder portion of the cranium; from the Pleistocene (Fig.) of Maidenhead, Berkshire. This specimen is described and figured by Owen in the Quart. Journ. Geol. Soc. vol. xii. p. 127, figs. 1-3 (1856).

*Presented by Sir John Lubbock, Bt., and Rev. Charles Kingsley, 1857.*

**1 b (O. C.).** The greater portion of the cranium, with the horns still remaining; from a frozen Pleistocene deposit in Eschscholtz Bay, Kotzebue Sound, Alaska, U.S.A. This specimen is noticed in the second volume of F. W. Beechey's 'Voyage to the Pacific and Behring's Straits in H.M.S. 'Blossom' during the years 1825 to 1828' (1831).

*Presented by Capt. F. W. Beechey, R.N.*

**24591.** The hinder part of the cranium, with the horn-cores; from the above-mentioned Pleistocene deposit.

*Presented by Capt. Kellet, R.N., and Lieut. Wood, R.N., 1850.*

**44070.** Hinder portion of the cranium of a small individual, with part of the horn-cores; from the Pleistocene of the Upper Porcupine River, Canada.

*Presented by Rev. Robert McDonald, 1873.*

**50099.** The four last associated lower cheek-teeth of the right side; from the Pleistocene of Crayford, Kent. These specimens are noticed by W. Davies in the Geol. Mag. dec. 2, vol. vi. p. 246.

*Presented by Robert Cheadle, Esq., 1879.*

**33594.** Two fragments of the cranium; from the Pleistocene of Greenstreet Green, Kent.

*Presented by Sir John Lubbock, Bart.*

### **Ovibos bombifrons** (Harlan<sup>1</sup>).

Syn. *Bos bombifrons*, Harlan<sup>2</sup>.

*Bootherium bombifrons*, Leidy.

*Hab.* North America.

**41142.** Cast of the hinder portion of the cranium and horn-cores. The original is from the Pleistocene of Big-Bone Lick, Kentucky, U.S.A., and is preserved in the Museum of the Academy of Natural Sciences, Philadelphia.

*Purchased, 1867.*

<sup>1</sup> Fauna Americana, p. 271 (1825), *Bos*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Proc. Ac. Nat. Sci. Philad. vol. vi. p. 71 (1852; vol. dated 1854).

**Ovibos cavifrons**, Leidy <sup>1</sup>.

Syn. *Bootherium cavifrons*, Leidy <sup>2</sup>.

*Hab.* North America.

- 40498.** Cast of the hinder portion of the cranium, with the horn-cores. The original is from the Pleistocene, near Fort Gibson, Arkansas River, U.S.A., and is preserved in the Museum of the Academy of Natural Sciences, Philadelphia.  
*Purchased*, 1867.

Genus **OVIS**, Linn. <sup>3</sup>

**Ovis** (?), sp.

*Hab.* England.

- 16758.** The left radius and part of the ulna of a ruminant, indistinguishable from the corresponding bone of a small sheep; from Kent's Cavern, Torquay, Devon.  
*McEnery Collection. Purchased*, 1842.
- 16758 a.** The proximal portion of a metacarpus, probably belonging to the same species; from Kent's Cavern.  
*McEnery Collection. Purchased*, 1842.

Genus **BUCAPRA**, Rüttimeyer <sup>4</sup>.

This genus is founded on the hornless cranium noticed below, which presents affinities both to the Oxen and Goats.

**Bucapra daviesi**, Rüttimeyer <sup>5</sup>.

*Hab.* India.

- 36677.** The cranium and mandible; from the Pliocene of the (Fig.) Siwalik Hills, India. This specimen is the type, and is described and figured by Rüttimeyer, *op. cit.* p. 105, pl. ii. figs. 6-9.

*Presented by the Secretary of State for India*, 1860.

Genus **CAPRA**, Linn. <sup>6</sup>

**Capra hircus**, Linn. <sup>7</sup>

*Hab.* South-western Asia, but introduced into most parts of the habitable world.

- 41372.** The calvarium and horn-cores; from a superficial deposit at Walthamstow, Essex.  
*Purchased*, 1869.

<sup>1</sup> Proc. Ac. Nat. Sci. Philad. vol. vi. p. 71 (1852; vol. dated 1854), *Bootherium*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Syst. Nat. ed. 12, vol. i. p. 97 (1766).

<sup>4</sup> 'Die Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vol. v.), p. 105 (1878).

<sup>5</sup> *Loc. cit.*

<sup>6</sup> Syst. Nat. ed. 12, vol. i. p. 94 (1766).

<sup>7</sup> *Loc. cit.*

**39223.** Frontlet and horn-cores; from a superficial deposit in Fenchurch Street, London. *Purchased, 1865.*

**47581.** Three fragments of the tibia of a Goat, probably belonging to this species; from the caverns of Windmill Hill, Gibraltar. These specimens are more recent than the remains of *C. pyrenaica* from the same locality.

*Brome Collection. Presented, 1876.*

### *Capra pyrenaica*, Schinz<sup>1</sup>.

Syn. *Capra hispanica*, Schimper<sup>2</sup>.

*Hab.* South-western Europe.

Busk, in describing the following specimens, from the caverns of Gibraltar, had some doubt whether they should be referred to the present form or to *C. ibex*. On distributional grounds it is more probable that they belong to the former.

*With one exception, all the following specimens belong to the Brome Collection. Presented, 1876.*

**47545.** The hinder portion of the cranium of a female; from a (*Fig.*) cavern in Windmill Hill, Gibraltar. This specimen is figured by Busk in the Trans. Zool. Soc. vol. x. pl. xxii. fig. 1.

**47556.** Five fragments of the hinder part of the cranium; from the caverns of Windmill Hill.

**47557.** Three horn-cores of females; from the caverns of Windmill Hill.

**47715.** The left horn-core of a male; from the Pleistocene of (*Fig.*) Malaga, Spain. This specimen is figured in transverse section by Busk, *loc. cit.* pl. xxii. figs. 5, 5 a.

**47557 a.** A horn-core of a female; from a cavern in Windmill Hill. (*Fig.*) Figured by Busk, *loc. cit.* pl. xxii. fig. 4.

**47546-7, 47555.** Five fragments of the maxilla; from the caverns of Windmill Hill.

**47546 a.** Fragment of the right maxilla, containing all the cheek-teeth except pm. 2, in a middle condition of wear; from a cavern in Windmill Hill. Figured by Busk, *loc. cit.* pl. xxiii. fig. 1; when figured pm. 2 was present.

<sup>1</sup> Denkschr. schw. Ges. Nat. vol. ii. p. 9 (1838).

<sup>2</sup> Comptes Rendus, vol. xxvi. p. 318 (1848).



- 47546 b. Fragment of the right maxilla, with the last five cheek-teeth; from a cavern in Windmill Hill.
47550. The greater part of the left maxilla and palatine, with the six cheek-teeth; from a cavern in Windmill Hill.
47551. Part of the right maxilla, showing all the cheek-teeth; from the Genista Cave, Gibraltar.
- 47546 c. Fragment of the right maxilla, with the six cheek-teeth, in a much-worn condition; from a cavern in Windmill Hill.
- 47555 a. Fragment of the right maxilla, showing m. 3 and part of m. 2; from a cavern in Windmill Hill.
- 47556 a. Fragment of frontals. Figured by Busk, *loc. cit.* pl. xxii. (*Fig.*) fig. 2.
47548. Two portions of the right ramus of the mandible; from the Genista Cave.
- 47549, 47552-3. Eight fragments of the mandible; from the caverns of Windmill Hill.
47554. Eleven fragments of the mandible of immature individuals; from the caverns of Windmill Hill.
47561. Two imperfect right scapulæ; from the caverns of Windmill Hill.
- 47561 a. The greater part of the left scapula; from a cavern in Windmill Hill.
47562. Four fragments of the humerus; from the caverns of Windmill Hill.
- 47562 a. The distal two-thirds of the left humerus; from a cavern in Windmill Hill. Figured by Busk, *loc. cit.* pl. xxiv. fig. 3.
- 47562 b. The left humerus, wanting the proximal extremity; from a cavern in Windmill Hill.
47563. The adjacent portions of the associated right humerus, radius, and ulna; from a cavern in Windmill Hill.
47564. Three fragments of the proximal half of the radius and ulna; from the caverns of Windmill Hill.
- 47564 a. The proximal half of the left radius and ulna; from a cavern in Windmill Hill. Figured by Busk, *loc. cit.* pl. xxiv. fig. 2.

47565. Two specimens of the radius, belonging to opposite sides : from the caverns of Windmill Hill.
- 47565 a. The left radius, with the distal portion of the ulna ; from (Fig.) a cavern in Windmill Hill. Figured by Busk, *loc. cit.* pl. xxvi. fig. 1.
47566. A small specimen of the right radius ; from the 'Judges' Cave,' Windmill Hill.
47567. Four specimens of the proximal extremity of the radius ; from the caverns of Windmill Hill.
47568. Two specimens of the proximal half of the left radius, of large size ; from the caverns of Windmill Hill.
- 47569 a. The left metacarpus ; from a cavern in Windmill Hill. (Fig.) Figured by Busk, *loc. cit.* pl. xxvi. fig. 3.
- 47569 b. The right metacarpus ; from a cavern in Windmill Hill. (Fig.) Figured by Busk, *loc. cit.* pl. xxvi. fig. 3.
47570. The proximal half of the right metacarpus ; from a cavern in Windmill Hill.
47571. The left metacarpus ; from a cavern in Windmill Hill.
47572. The distal portion of a metacarpus ; from a cavern in Windmill Hill.
47573. The greater part of the left metacarpus ; from the Genista Cave.
- 47573 a. The left metacarpus ; from the Genista Cave. Figured (Fig.) by Busk, *loc. cit.* pl. xxvi. fig. 2.
- 47573 b. The left metacarpus ; from a cavern in Windmill Hill. (Fig.) Figured by Busk, *loc. cit.* pl. xxvi. fig. 4.
24823. The left metacarpus, either of the present species or *Capra ibex* ; from the Pleistocene of the Auvergne, France.  
*Croizet Collection. Purchased, 1848.*
47574. Three fragments of the innominate ; from the caverns of Windmill Hill.
47575. The left femur, imperfect distally ; from a cavern in Windmill Hill.
- 47575 a. The right femur, imperfect distally ; from a cavern in (Fig.) Windmill Hill. Figured by Busk, *loc. cit.* pl. xxvi. fig. 1.
- 47575 b. The proximal half of the right femur ; from a cavern in (Fig.) Windmill Hill.

47576. Seven fragments of the femur ; from the caverns of Windmill Hill.
47578. The left tibia ; from the 'Judges' Cave,' Windmill Hill. (Fig.)    Figured by Busk, *loc. cit.* pl. xxv. fig. 3.
47579. The distal two-thirds of the left tibia ; from a cavern in Windmill Hill.
47580. The distal two-thirds of the right tibia ; from a cavern in Windmill Hill.
- 47581 c. The distal third of the left tibia ; from a cavern in Windmill Hill. (Fig.)    mill Hill.
47584. The greater portion of the left calcaneum ; from a cavern in Windmill Hill.
47585. Three specimens of the astragalus ; from the caverns of Windmill Hill.
- 47585 a. The left astragalus ; from a cavern in Windmill Hill. (Fig.)    Figured by Busk, *loc. cit.* pl. xxv. fig. 5.
47582. The right metatarsus ; from a cavern in Windmill Hill.
47583. Three imperfect specimens of the metatarsus ; from a cavern in Windmill Hill.
47586. Five phalangeals ; from the caverns of Windmill Hill.
- 47586 a. A terminal phalangeal ; from a cavern in Windmill Hill. (Fig.)    Figured by Busk, *loc. cit.* pl. xxv. fig. 6 b.
47587. A terminal phalangeal ; from a cavern in Windmill Hill. (Fig.)    Figured by Busk, *loc. cit.* pl. xxv. fig. 6 a, c.
47558. The atlas vertebra ; from a cavern in Windmill Hill. (Fig.)    Figured by Busk, *loc. cit.* pl. xx. fig. 3 (lettered 2).
47559. Two imperfect specimens of the axis vertebra ; from the caverns of Windmill Hill.
- 47559 a. The axis vertebra, with the summit of the neural spine broken off ; from a cavern in Windmill Hill. Figured by Busk, *loc. cit.* pl. xx. fig. 4.
47560. The sacrum ; from a cavern in Windmill Hill.

**Capra sivalensis**, Lydekker<sup>1</sup>.

This species is allied to the living Indian *Capra jemlaica*, or Thar.

*Hab.* India.

39794. The calvarium and horn-cores; from the Pliocene of the (Fig.) Siwalik Hills, India. This specimen is the type, and is described and figured by the present writer, *op. cit.* p. 169, pl. xxviii. figs. 1, 2.

*Cautley Collection. Presented, 1842.*

36674. The calvarium and the lower halves of the horn-cores; from the Pliocene of the Siwalik Hills.

*Presented by the Secretary of State for India, 1860.*

**Capra**, *sp. a.*

*Hab.* India.

40625. Fragment of the left half of the calvarium and part of the horn-core; from the Pliocene of the Siwalik Hills, India. This specimen is much larger than the preceding, but apparently indicates an allied form.

*Cautley Collection. Presented, 1842.*

**Capra**, *sp. b.*

Apparently allied to the living Indian *Capra megaceros*.

*Hab.* India.

- 40625 a. Terminal portion of the left horn-core; from the Pliocene of the Siwalik Hills, India. This specimen agrees with the middle portion of a left horn-core, figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pl. xxviii. fig. 3. *Cautley Collection. Presented, 1842.*

**Capra (?) rozeti**, Pomel<sup>2</sup>.

This species is founded on the original of the specimen noticed below, which indicates an animal larger than any living species of the genus, and as suggested by Busk (*Trans. Zool. Soc.* vol. x. p. 116) may perhaps belong to an Antelope.

*Hab.* France.

<sup>1</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. 169 (1878).

<sup>2</sup> Comptes Rendus, vol. xix. p. 224 (1844).



27626. Cast of the associated last four cheek-teeth of the right side. The original, which is the type of the species, is from the Upper Pliocene of Malbaltu, near Issoire (Puy-de-Dôme), France. *Croizet Collection. Purchased, 1848.*

Genus **TRAGOCEROS**, Gaudry<sup>1</sup>.

The dentition of this genus is essentially antelopine, but the laterally compressed horn-cores are caprine. There is no lachrymal depression in the cranium.

**Tragoceros amaltheus** (Roth and Wagner<sup>2</sup>).

Syn. *Capra amalthea*, Roth and Wagner<sup>3</sup>.

(?) *Antilope speciosa*, Roth and Wagner<sup>4</sup>.

*Hab.* South Europe.

49706. Part of the left maxilla, showing the six cheek-teeth in a well-worn condition; from the Lower Pliocene of Pikermi, Attica. This specimen agrees with the one figured by Gaudry in the 'Animaux fossiles et Géologie de l'Attique,' pl. xlix. fig. 2. *Purchased, 1879.*
49707. Fragments of the right maxilla of an immature individual, showing pm. 3, pm. 4, m. 1, and m. 2; from the Lower Pliocene of Pikermi. *Purchased, 1879.*
36597. Fragment of the palate, showing pm. 2 of either side; from the Lower Pliocene of Pikermi. *Presented by P. J. Gran, Esq., 1853.*
49708. Part of the left ramus of the mandible, showing all the cheek-teeth except pm. 2; from the Lower Pliocene of Pikermi. This specimen agrees with the one figured by Gaudry, *op. cit.* pl. xlix. fig. 4. *Purchased, 1879.*
49709. Fragment of the right ramus of the mandible of an immature individual, showing pm. 3, mm. 4, and m. 1; from the Lower Pliocene of Pikermi. *Purchased, 1879.*
49721. Fragment of the right ramus of the mandible, with m. 1 and m. 2; from the Lower Pliocene of Mont Lebéron (Vaucluse), France. *Purchased, 1879.*

<sup>1</sup> Comptes Rendus, vol. lii. p. 208 (1861).

<sup>2</sup> Abh. math.-phys. Cl. k.-bay. Ak. Wiss. vol. vii. pt. 2, p. 453 (1854), *Capra*.

<sup>3</sup> *Loo. cit.*

<sup>4</sup> *Ibid.* p. 452.

- 49710, 49711. The right astragalus, the distal extremity of a metapodial, and three phalangeals (1st, 2nd, and 3rd); from the Lower Pliocene of Pikermi. *Purchased, 1879.*

Genus **PALÆOREAS**, Gaudry<sup>1</sup>.

This genus is closely allied to the living *Oreas*, with perhaps some relationship to *Strepsiceros*.

**Palæoreas lindermayeri** (Wagner<sup>2</sup>).

Syn. *Antilope lindermayeri*, Wagner<sup>2</sup>.

*Hab.* South Europe.

49712. Part of the calvarium and the left horn-core; from the Lower Pliocene of Pikermi, Attica. This specimen agrees precisely with the nearly complete cranium figured by Gaudry, in the 'Animaux fossiles et Géologie de l'Attique,' pl. liii. figs. 1, 2. *Purchased, 1879.*
49713. Fragment of the left ramus of the mandible, showing the three true molars; from the Lower Pliocene of Pikermi. This specimen agrees precisely with the one figured by Gaudry, *op. cit.* pl. liii. fig. 3. *Purchased, 1879.*
49714. A proximal phalangeal; from the Lower Pliocene of Pikermi. *Purchased, 1879.*

Genus **STREPSICEROS**, Gray<sup>4</sup>.

**Strepsiceros (?) falconeri**, Lydekker<sup>5</sup>.

This species is founded on the cranium noticed below, which, if not belonging to *Strepsiceros*, indicates a closely allied form.

*Hab.* India.

37262. The greater part of the cranium of an immature individual, showing the base of the right horn-core; from the Pliocene Siwaliks of Perim Island, Gulf of Cambay, India. The nasals and anterior part of the jaw are wanting; the palate obscured, and the teeth partly broken; m 3 is *in alveolo*. This specimen agrees with *Oreas* and *Strepsiceros*

<sup>1</sup> Comptes Rendus, vol. lii. p. 297 (1861).

<sup>2</sup> Abh. math.-phys. Cl. k.-bay. Ak. Wiss. vol. v. pt. 2, p. 367 (1848), *Antilope*.

<sup>3</sup> *Loc. cit.*

<sup>4</sup> List of Mammalia in British Museum, p. 155 (1843).

<sup>5</sup> Geol. Mag. dec. 3, vol. ii. p. 170 (1885).

by the depressed frontals, with large supraorbital pits, but differs from the former by the absence of a protuberance in the lachrymal, and the position of the notch in the rim of the orbit. It closely resembles a young male of *Strepsiceros kudu* in the form of the frontals, the supra-orbital pits, the wide interval between the horn-cores, the characteristic straight profile, and the general structure of the cheek-teeth. The horn-cores are, however, much smaller, in which respect *Strepsiceros imberbis* makes a nearer approach to the fossil. The molar teeth have a distinct inner accessory column. When mature, the fossil species was probably nearly as large as the Kudu; the small size of the horn-cores is a character which might be expected to occur in a primitive form.

*Presented by Walter Ewer, Esq.*

Genus **BOSELAPHUS**, Blainville<sup>1</sup>.

Syn. *Portax*, Hamilton Smith<sup>2</sup>.

**Boselaphus namadicus** (Rütimeyer<sup>3</sup>).

Syn. *Portax namadicus*, Rütimeyer<sup>4</sup>.

*Hab.* India.

**36851.** The calvarium and horn-cores; from the Pleistocene of the (Fig.) Narbada Valley, India. This specimen is the type, and is described and figured by Rütimeyer, *op. cit.* p. 89, pl. vi. figs. 7, 8. *Presented by C. Fraser, Esq. Before 1843.*

**36853.** The calvarium and horn-cores; from the Pleistocene of the Narbada Valley. Noticed by Rütimeyer, *op. cit.*

*Presented by C. Fraser, Esq. Before 1843.*

**Boselaphus**, sp., Lydekker<sup>5</sup>.

*Hab.* India.

**M. 1940.** A left upper true molar; from the Pliocene Siwaliks of the Punjab, India.

*Presented by the Superintendent of the Geological Survey of India, 1884.*

<sup>1</sup> Bull. Soc. Philom. Paris, 1816, p. 75.

<sup>2</sup> In Griffith's 'Animal Kingdom,' vol. v. p. 366 (1827).

<sup>3</sup> 'Die Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vol. v.), p. (1878), *Portax*.

<sup>4</sup> *Loc. cit.*

<sup>5</sup> Palæontologia Indica, ser. 10, vol. iii. p. 114 (1884).

- M. 1940 a.** Fragment of the right maxilla of an immature individual, containing mm. 3, mm. 4, and the anterior lobe of m. 1; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

Genus **HIPPOTRAGUS**, Sundevall <sup>1</sup>.

Syn. *Egocerus*, Desmarest <sup>2</sup>.

*Egocerus*, H. Smith <sup>3</sup> (amended, Gray).

**Hippotragus sivalensis**, Lydekker <sup>4</sup>.

Syn. *Antilope sivalensis*, Lydekker <sup>5</sup>.

This species apparently nearly equals in size the living *H. niger*. It was provisionally referred to this genus by the present writer in the 'Geol. Mag.' dec. 3, vol. ii. p. 170 (1885).

*Hab.* India.

- 39558.** The cranium of an immature male, showing the bases of the horn-cores, but wanting the muzzle and part of the occiput; from the Pliocene of the Siwalik Hills, India. This specimen agrees precisely in form with the type cranium figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pl. xxv. figs. 1, 2, but evidently indicated a considerably larger animal; the type specimen probably, therefore, belonged to a female. The penultimate and last milk-molars are still *in situ*, while m. 3 is not protruded. The general contour of the skull is the same as in *Hippotragus niger*: it shows the absence of a distinct lachrymal depression, the existence of a small elongate lachrymal fissure, and similar supraorbital foramina without pits at their exit; the extremity of the maxilla is similarly expanded in both; the orbit large, with a notch situated below the level of the supraorbital foramen; and the horn-cores are similarly situated above the orbits, with a considerable interval between them, and directed at their bases upwards and backwards; there is also the same strongly-marked ridge descending from the orbit to

<sup>1</sup> K. Svenska Vet.-Akad. Handl. for 1844, p. 196.

<sup>2</sup> 'Mammalogie,' p. 475 (1822).

<sup>3</sup> In Griffith's 'Animal Kingdom,' vol. v. p. 324 (1827).

<sup>4</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. 154 (1878).

*Antilope.*

<sup>5</sup> *Loc. cit.*



the first true molar in both skulls. The palate is generally similar in the two, but the anterior pair of basioccipital tubercles are more approximated in the fossil; both present the same deep concavity in the middle line in advance of the premolars. The molar teeth of the existing form have very square crowns, of a remarkably bovine appearance, and provided with a large internal accessory column, expanded at its inner termination. In the fossil *mm.* 4 is alone in a condition to exhibit the characteristic features, and this tooth agrees very closely with the molars of the existing species. In the type specimen the crowns of the molars are broken off; but their bases exhibit the characteristic square form. The united length of *m.* 1 and *m.* 2 in the present specimen is nearly the same as in *H. niger*, thus indicating that adult specimens of the fossil were about the size of this species.

The resemblance between the living and fossil species is so close as to leave little doubt of their generic identity.

*Presented by Dr. Hugh Falconer.*

Genus **GAZELLA**, Blainville<sup>1</sup>.

**Gazella porrecticornis**, Lydekker<sup>2</sup>.

Syn. *Antelope porrecticornis*, Lydekker<sup>3</sup>.

*Hab.* India.

**M. 2254.** Fragment of the palate, showing *m.* 1 and *m.* 2 on the left and part of *pm.* 4 on the right side; from the Pliocene of the Siwalik Hills, India. This is slightly larger than the palate of the living *Gazella bennetti*, but is in other respects precisely similar; it is highly probable that it belongs to the present species.

*Cautley Collection. Presented, 1842.*

**M. 2255, 16536.** Two fragments of the left ramus of the mandible; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

<sup>1</sup> Bull. Soc. Philom. Paris, 1816, p. 75.

<sup>2</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. 158 (1878), *Antelope*.

<sup>3</sup> *Loc. cit.*

**Gazella deperdita** (P. Gervais<sup>1</sup>).

Syn. *Antilope deperdita*, P. Gervais<sup>2</sup>.

*Antilope capricornis*, Wagner<sup>3</sup>.

*Antilope brevicornis*, Wagner<sup>4</sup>.

*Gazella brevicornis*, Gaudry<sup>5</sup>.

Gaudry ('Animaux fossiles du Mont Lebéron,' p. 57 [1873]) has expressed his opinion that the so-called *G. brevicornis* of Pikermi is indistinguishable from the Vaucluse form; and this is borne out by the specimens in the Museum. A cranium is figured by Gaudry, *loc. cit.* pl. xi.

*Hab.* South Europe.

**38145.** Frontlet and horn-cores; from the Lower Pliocene of Pikermi, Attica. *Purchased, 1864.*

**49716.** Two horn-cores; from the Lower Pliocene of Pikermi. *Purchased, 1879.*

**34756.** The detached left horn-core; from the Lower Pliocene of Cucuron (Vaucluse), France. *Bravard Collection. Purchased, 1852.*

**34757-9.** Three specimens of the frontlet and horn-cores; from the Lower Pliocene of Cucuron. *Bravard Collection. Purchased, 1852.*

**26645.** Three horn-cores; from the Lower Pliocene of Cucuron. *Pomel Collection. Purchased, 1851.*

**49720.** Part of the frontlet and horn-cores; from the Lower Pliocene of Mont Lebéron (Vaucluse). *Purchased, 1879.*

**34780.** The right upper cheek-dentition, in a well-worn condition; from the Lower Pliocene of Cucuron. These teeth are relatively wider than in *G. bennetti*. *Bravard Collection. Purchased, 1852.*

**34792.** Part of the left ramus of the mandible, containing the four last cheek-teeth; from the Lower Pliocene of Cucuron. *Bravard Collection. Purchased, 1852.*

**34794.** The greater portion of the left ramus of the mandible; from the Lower Pliocene of Cucuron. *Bravard Collection. Purchased, 1852.*

<sup>1</sup> Comptes Rendus, vol. xxiv. p. 801 (note) (1847), *Antilope*. <sup>2</sup> *Loc. cit.*

<sup>3</sup> Abh. math.-phys. Cl. k.-bay. Ak. Wiss. vol. v. pt. 2, p. 368 (1848).

<sup>4</sup> *Ibid.* vol. vii. pt. 2, p. 452 (1854).

<sup>5</sup> Comptes Rendus, vol. lii. p. 297 (1861).

26647. Two fragments of the mandible; from the Lower Pliocene of Cucuron. *Pomel Collection. Purchased, 1851.*
49715. Part of the right ramus of the mandible, with four cheek-teeth; from the Lower Pliocene of Pikermi. *Purchased, 1879.*
- 49716 a. Part of the right ramus of the mandible, with  $\overline{\text{pm. 3}}$ ,  $\overline{\text{pm. 4}}$ ,  $\overline{\text{m. 1}}$ , and  $\overline{\text{m. 2}}$ ; from the Lower Pliocene of Pikermi. *Purchased, 1879.*
- 34824-28. The calcaneum, astragalus, naviculo-cuboid, and metatarsus; from the Lower Pliocene of Cucuron. *Bravard Collection. Purchased, 1852.*

### **Gazella anglica, Newton<sup>1</sup>.**

*Hab.* England.

33516. The horn-core and part of the left frontal; from the Norwich Crag (Upper Pliocene) of Norfolk. This specimen is noticed by E. T. Newton, *loc. cit.* p. 282. *Wigham Collection. Purchased, 1859.*
- 33516 a. The distal half of the left tibia of a small ruminant provisionally referred by Newton (*loc. cit.*) to the present species; from the Norwich Crag of Norwich. *Wigham Collection. Purchased, 1859.*

### Genus **ANTILOPE**, Pallas<sup>2</sup>.

#### **Antilope cervicapra (Linn.<sup>3</sup>).**

*Syn.* *Capra cervicapra*, Linn.<sup>4</sup>

*Hab.* India.

37264. The lower half of a right horn-core, indistinguishable from that of the existing Indian Antelope; probably from the Pleistocene of the Narbada or Jumna Valley, India. *(?) Presented by Walter Ewer, Esq.*
37268. The lower half of a rather larger left horn-core, similar in form to the last; from the Pleistocene of Piparea, Narbada Valley. *Presented by C. Fraser, Esq. Before 1843.*

<sup>1</sup> Quart. Journ. Geol. Soc. vol. xl. p. 280 (1884).

<sup>2</sup> Spicilegia Zoologica, vol. i. p. 3 (1767).

<sup>3</sup> Syst. Nat. ed. 12, vol. i. p. 96 (1766), *Capra*.

<sup>4</sup> *Loc. cit.*

Genus **COBUS**, A. Smith<sup>1</sup>.Including *Adenota* and *Onotragus*, Gray.**Cobus** (?) **palæindicus**, Lydekker, n. sp.

This species is founded on the first of the specimens noticed below, which the writer hopes to figure on a subsequent occasion in the 'Palæontologia Indica.'

*Hab.* India.

- M. 2402.** The cranium, in a somewhat damaged condition, and wanting the greater part of the horn-cores; from the Pliocene of the Siwalik Hills. This specimen is the type, and indicates an animal about one third smaller than the existing African *C. sing-sing*. It agrees with the cranium of the latter in the large frontal depression and foramina, in the general outline of the cranium, position of the orbits, setting-on of the horn-cores, the form of the basi-occipital tubercles, of the bullæ, and the hinder part of the palate; the molars also agree in their relative small size and the general absence of internal accessory columns. The specimen is readily distinguished from *C. sing-sing* by its narrower proportions and inferior size, and does not appear to come closer to any other species; its resemblance to the former is so strong as to justify at least its provisional reference to the same genus.

*Transferred from the Old India Museum, 1880.*

- 39559.** The hinder portion of a cranium<sup>2</sup>, apparently belonging to the present species; from the Siwalik Hills. This specimen shows the basal halves of the horn-cores: in the depressed frontals, large supraorbital pits, facial vacuity, and basioccipital, it agrees with the type and with *Cobus sing-sing*. The horn-cores are widely separated, rounded, and are directed upwards, backwards, and somewhat outwards.

*Presented by Dr. Hugh Falconer.*

- 48456 d.** Fragment of a right frontal and horn-core, apparently belonging to the same species; from the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

<sup>1</sup> Illustr. Zool. of S. Africa, No. 12 (1840), *Kobus*.

<sup>2</sup> This and the two following specimens are noticed in the Geol. Mag. dec. 3, vol. ii. p. 171 (1885), but were not then generically determined.



**Cobus (?) patulicornis, Lydekker<sup>1</sup>.**

Syn. *Antilope patulicornis*, Lydekker<sup>2</sup>.

This form is provisionally referred to the same genus as the last.  
*Hab.* India.

- 39559 a.** The hinder part of the cranium, with the basal halves of the horn-cores; from the Pliocene of the Siwalik Hills, India. This specimen appears to indicate a species allied to the last, but with more divergent horn-cores; it agrees with the type frontlet figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pl. xxv. fig. 3.

*Presented by Dr. Hugh Falconer.*

- 17237.** The hinder part of the cranium, showing the bases of the horn-cores; from the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

- 48456.** Part of the left horn-core and frontal, apparently belonging to this species; from the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

- 48456 a.** Part of the left horn-core and frontal; from the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

- 48457 b.** Fragments of a left horn-core and frontal, somewhat similar to the last; from the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

GENUS *non det.*

(*Resembling Cobus.*)

*Hab.* India.

- M. 2402 a.** Part of the frontlet and left horn-core of a very large Antelope; from the Pliocene Siwaliks of Perim Island, Gulf of Cambay, India. This specimen (which is noticed by the writer in the Geol. Mag. dec. 3, vol. ii. p. 170, as No. 18785) shows the depressed frontals of *Cobus*, with which it also agrees in the wide interval between the horn-cores, and the general direction of the latter, which, in the portion still remaining, is outwards and backwards. The horn-cores are compressed, with a well-marked internal angle.

*Transferred from the Old Indian Museum in 1880, having been presented to that Institution by A. Bettington, Esq., in 1847.*

<sup>1</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. 157 (1878), *Antilope*.

<sup>2</sup> *Loc. cit.*

18785. Part of the left frontal and horn-core of a smaller specimen, apparently belonging to the same species; from the Siwaliks of Perim Island. *Purchased, 1845.*

Genus **ALCELAPHUS**, Blainville<sup>1</sup>.

Including *Damalis*, Gray.

**Alcelaphus palæindicus** (Falconer<sup>2</sup>).

Syn. *Antilope palæindica*, Falconer<sup>3</sup>.

In its general contour and proportions the cranium is very similar to that of *Alcelaphus tora*, but there is a concavity in the frontal profile, and a great difference in the direction of the horn-cores, which agrees more nearly with that obtaining in *A. albifrons* and *A. pygargus*.

*Hab.* India.

39594. The cranium and horn-cores, with a second specimen of the palate; from the Pliocene of the Siwalik Hills, India. (*Fig.*) This specimen is described and figured by W. E. Baker in the Journ. As. Soc. Beng. vol. xii. pt. 2, p. 770, pl. xxiii. figs. 1-3 (1843); and is figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxiii. It is noticed by Rüttimeyer in the 'Rinder der Tertiär-Epoche' (Abh. schweiz. pal. Ges. vol. v.), p. 88. The molars are of a narrow elongated form, and have no distinct inner accessory column.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

- 39594 a. The palate, with the whole of the cheek-dentition; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

39596. The palate, with the whole of the cheek-dentition; from the Pliocene of the Siwalik Hills.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

- 39594 b. The palate, showing the greater portion of the cheek-dentition; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

- 39594 c. Hinder part of the palate, showing the cheek-dentition, in an early stage of wear; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

<sup>1</sup> Bull. Soc. Philom. Paris, 1816, p. 75.

<sup>2</sup> Catalogue of Fossil Vertebrata of Asiatic Society of Bengal, p. 154 (1859), *Antilope*.

<sup>3</sup> *Loc. cit.*

- 39594 d.** The anterior portion of the cranium, showing the cheek-dentition, in a well-worn condition; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*
- 39571.** The palate and the associated middle portion of the mandible; from the Pliocene of the Siwalik Hills.  
*Cautley Collection. Presented, 1842.*
- 36668.** The distal half of a radius, and a palate, not improbably belonging to an immature individual of the present species; from the Pliocene of the Siwalik Hills.  
*Presented by the Secretary of State for India, 1860.*

***Alcelaphus bakeri*, Lydekker<sup>1</sup>.**

This species is founded on the cranium noticed below, which apparently indicates an animal closely allied to the existing *A. pygargus*, or Bonte-bok. The horn-cores are more approximated than in *A. palæindicus*, and the face shorter, with a shallower lachrymal depression.

*Hab.* India.

- 39598.** The greater portion of the cranium of an immature individual, showing the bases of the horn-cores, but wanting a considerable portion of the face; from the Pliocene of the Siwalik Hills, India. The last true molar is not protruded, and the sutures are mostly invisible; the distal portion of a horn-core has been crushed into the face. The specimen agrees very closely in general contour with the cranium of *A. pygargus*, especially in the form of the flattened frontals; the closely approximated horn-cores, placed on a high-pitched ridge; the form of the lachrymal depression, and apparently of the nasals; as well as in the absence of supraorbital pits and of a lachrymal vacuity; a process of the maxilla runs up between the frontal and lachrymal in both. The fossil is somewhat smaller than the recent skull; but this is no doubt partly due to immaturity, as the cheek-teeth of the former are larger than those of the latter. The occipital and basi-occipital regions, as well as the hinder part of the palate, are almost precisely the same in the two forms. The palatal vacuities appear to be placed less anteriorly in the fossil; but this also may be partly due to immaturity. The horn-cores had the same relative position in the fossil as in the

<sup>1</sup> *Geol. Mag.* dec. 3, vol. ii. p. 170 (1885).

recent species, and when complete may very probably have had the same general direction. The molars are of a narrow elongated type (as in the recent species) and have no distinct internal accessory column. The structure of these teeth, the high-pitched ridge between the horn-cores, the close approximation of the latter, and the absence of any lachrymal fissure, at once distinguishes this specimen from the cranium of *Hippotragus sivalensis*. Its close resemblance to that of *Alcelaphus pygargus* indicates very strongly its generic identity.

It may be observed that the present specimen presents some resemblance to the cranium of *Paleoryx pallasi*<sup>1</sup>; but the horn-cores of the latter are placed more posteriorly, and there is no lachrymal depression.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

#### ANTELOPES OF UNCERTAIN GENERIC POSITION.

##### Species 1. (*Probably allied to Oreas.*)

*Hab.* India.

16657. Fragment of the right maxilla of a very large Antelope, probably allied to the Eland, showing the last five cheek-teeth; from the Pliocene of the Siwalik Hills, India. This specimen is noticed by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 114, note 4.

*Cautley Collection. Presented, 1842.*

##### Species 2. (*Of uncertain affinity.*)

*Hab.* India.

- 39559 b. The hinder portion of the cranium, with the base of the right horn; from the Pliocene of the Siwalik Hills, India. This specimen is noticed by the present writer in the Geol. Mag. dec. 3, vol. ii. p. 171 (1885); and is distinguished from the two preceding species by the nearly vertical direction of the base of the horn-core, the absence of distinct supraorbital pits, and the much more obtuse angle formed by the junction of the facial and frontal planes. It strikingly resembles an imperfect cranium from the Lower Pliocene of Pikermi, figured by Gaudry in the 'Animaux fossiles et Géologie de l'Attique,' pl. lii. fig. 1.

*Cautley Collection. Presented, 1842.*

<sup>1</sup> *Vide* Gaudry, 'Animaux fossiles et Géologie de l'Attique,' pl. xlvii. fig. 1.



\* *Female Crania.*

36673. The cranium of a hornless and probably female form ; from the Pliocene of the Siwalik Hills. This and the following specimen may be specifically identical with one or other of the foregoing species of Siwalik Antelopes.

*Presented by the Secretary of State for India, 1860.*

39569. The cranium of another, and apparently different, hornless form ; from the Pliocene of the Siwalik Hills.

*Presented by Dr. Hugh Falconer.*

Species 3. (**Antilope clavata**, P. Gervais<sup>1</sup>).

Syn. *Antilope sansaniensis*, Lartet<sup>2</sup>.

The affinities of this undescribed form are unknown ; the horn-cores are of extremely small size.

*Hab.* France.

21860. Two horn-cores, attached to fragments of the frontals ; from the Middle Miocene of Sansan (Gers), France.

*Croizet Collection. Purchased, 1848.*

## Family GIRAFFIDÆ.

Syn. *Camelopardalidæ*.

In this family, which is taken to include the *Sivatheriidae*, the cranial appendages, when present, appear intermediate in character between those of the *Bovidae* and *Cervidae*. The teeth are always invested with a rugose enamel.

*Dentition*:—I.  $\frac{0}{3}$ , C.  $\frac{0}{1}$ , Pm.  $\frac{3}{3}$ , M.  $\frac{3}{3}$ .

Genus **SIVATHERIUM**, Falconer and Cautley<sup>3</sup>.

By some writers this genus is considered to be more closely allied to the Antelopes than to the Giraffes ; but the kindred Indian genera, *Hydaspiatherium* and *Vishnutherium*, appear to have decided giraffoid characters, which also occur in the limb-bones of the present genus. There are two pairs of cranial appendages, the bases of each being separate. The anterior pair are conical, like those of the Giraffe ; while the posterior are palmate and resemble the antlers of the Elk. There is no lachrymal vacuity in the

<sup>1</sup> Zool. et Pal. Françaises, 1st ed. p. 78 (1848-52).

<sup>2</sup> Notice sur la Colline de Sansan, p. 36 (1851).

<sup>3</sup> Asiatic Researches, vol. xix. p. 1 (1836).

cranium ; and the nasals are short and arched. The neck and limbs are short.

**Sivatherium giganteum**, Falconer and Cautley<sup>1</sup>.

This is the only known species ; and its characters are therefore those of the genus.

*Hab.* India.

All the specimens noticed below are from the Siwalik Hills, and, unless otherwise stated, belong to the *Cautley Collection* (*Presented*, 1842). Some of the smaller limb-bones may belong to *Heladotherium*, which occurs in the Siwalik Hills; *Hydaspitherium* apparently not ranging east of the Punjab.

**15283.** The cranium, wanting the posterior antlers and the extremity (*Fig.*) of the muzzle. This specimen is the type, and is figured by Falconer and Cautley in the 'Asiatic Researches,' vol. xix. pl. i., and in the 'Fauna Antiqua Sivalensis,' pls. xci. & xcii. fig. 1 ; it is also figured in 'Falconer's Palæontological Memoirs,' vol. i. pls. xix. & xx.

**M. 1336.** Cast of the preceding cranium, with the antlers restored. The position of the antlers is different from that in the restored figure in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxi. fig. 4. *Constructed in the Museum.*

**17088.** Fragment of the middle portion of the cranium, showing (*Fig.*) the root of the nasals and the bases of the anterior pair of antlers. This specimen is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. xcii. fig. 2, and (unpublished) pl. A. fig. 3.

**15280.** Anterior part of the cranium, showing the complete cheek-dentition.

**15283 a.** Cast of the hinder portion of the cranium, showing the bases of both the posterior antlers ; and part of the base of the right antler. The original is from near Nahan, in the Siwalik Hills, and is preserved in the Museum of the University of Edinburgh. It is figured by Colvin in the Journ. As. Soc. Beng. vol. vi. pl. viii. ; by Royle in his 'Botany of the Himalaya Mountains,' vol. ii. pl. vi. fig. 1c ; by Falconer and Cautley in the 'Fauna Antiqua Sivalensis' (unpublished), pl. A. fig. 2 ; and by Murchison in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxi. fig. 2.

*No history.*

<sup>1</sup> Asiatic Researches, vol. xix. p. 1 (1836).

**39525.** The greater portion of the left antler. This specimen is (Fig.) the model from which the antlers in the cast No. 15983 *a* are restored; it is figured by Cautley and Falconer, in the 'Fauna Antiqua Sivalensis' (unpublished), pl. A. fig. 4; and in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxi. fig. 3. *Presented by Dr. Hugh Falconer.*

**39524.** Fragment of a posterior antler. This specimen is figured (Fig.) by Falconer and Cautley, *loc. cit.* pl. A. fig. 5.

**39524 a.** Fragment of a very large antler, showing very distinctly the arterial and venous grooves.

*Presented by Dr. Hugh Falconer.*

**M. 1513.** Fragment of a large antler.

*Transferred from the Old India Museum, 1880.*

**16263.** Fragment of the left maxilla, containing  $\overline{m. 2}$  and  $\overline{m. 3}$  in an early stage of wear. These specimens are considerably larger than the molars of the type cranium.

**16244.** Three imperfect left upper true molars.

**16244 a.** The third left upper premolar, in an early stage of wear.

**16397.** Two right upper true molars, one broken.

**48928.** Fragment of the right maxilla of a young individual containing the three milk-molars, in a very early stage of wear.

**48928 a.** Fragment of the right maxilla of a smaller, and perhaps distinct, Sivatheroid, containing  $\underline{mm. 3}$  and  $\underline{mm. 4}$ .

**40677.** The greater part of the left ramus of the mandible, containing the three true molars and the last premolar in an early stage of wear; from the neighbourhood of Dádúpúr, in the Siwalik Hills. This specimen is figured by Colvin in the Journ. As. Soc. Beng., vol. vi. pl. ix.; by Royle in the 'Botany of the Himalaya Mountains,' pl. vi. fig. 1 *d* (1839); and by Murchison in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxi. fig. 1. Its measurements are given by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. p. 121. *Presented by Colonel Colvin.*

**36741.** Fragment of the left ramus of the mandible, containing the three true molars and a part of  $\underline{pm. 4}$ . The teeth are in a more worn condition, but the specimen agrees very closely in size with the last.

28106. The greater portion of the right ramus of a somewhat smaller but otherwise indistinguishable mandible, containing all the cheek-teeth except  $\overline{\text{pm. 2}}$ , in a well-worn condition. *Presented by Colonel Colvin.*
16387. Part of the right ramus of the mandible, containing the four last cheek-teeth, in an early condition of wear.
16260. Fragment of the right ramus of the mandible of a very large individual. This specimen shows the second and third lobes of  $\overline{\text{m. 3}}$ , and is remarkable for the extraordinarily large size of the external accessory columns.
16309. Fragment of the right ramus of the mandible of a large specimen, containing  $\overline{\text{m. 1}}$  and  $\overline{\text{m. 2}}$ , in a slightly worn condition.
16258. Fragment of the left ramus of the mandible containing  $\overline{\text{pm. 4}}$  and  $\overline{\text{m. 1}}$ .
16385. Part of the right ramus of the mandible, containing  $\overline{\text{pm. 4}}$  and  $\overline{\text{m. 1}}$ , in a very much worn condition.
16168. Fragment of the right ramus of the mandible with  $\overline{\text{pm. 3}}$ .
16306. Part of the left ramus of the mandible, with the three true molars (3rd imperfect), in a much worn condition.
16243. The much worn second right lower true molar.
16398. The third right lower true molar. Neither this nor either of the three following specimens shows any trace of an external accessory column.
16262. The third right lower true molar, in an unworn condition.
16249. The third left lower true molar, in an early stage of wear.
16245. The third right lower molar, in a similar condition of wear.
15288. The nearly complete mandible of a young individual, showing the three milk-molars of both sides and the right canine. The teeth of this specimen agree very closely with those of the somewhat older jaw figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. pl. xxi. fig. 3 : there are large outer accessory columns in  $\overline{\text{mm. 3}}$ . There is a very similar specimen in the Dublin Museum of Science and Art (*vide* Journ. R. Dublin Soc. ser. 2, vol. iii. p. 79<sup>1</sup>).

<sup>1</sup> The writer was unaware of the existence of this specimen when noticing the Dublin jaw.



**15288 a.** The extremity of the symphysis of the mandible of a young individual, showing the unworn canine and the three incisors of either side. The left canine agrees precisely with the corresponding tooth of the preceding specimen.

**36680.** The glenoidal half of the left scapula. Figured by Falconer (*Fig.*) and Cautley, *loc. cit.* (unpublished), pl. C. fig. 2. The large coracoid process is a giraffe-like character.

*Presented by the Secretary of State for India, 1860.*

**39531.** The glenoidal extremity of the left scapula. Figured by (*Fig.*) Falconer and Cautley, *loc. cit.* (unpublished), pl. C. fig. 3.

**39688.** The left humerus. Figured by Falconer and Cautley, *loc. cit.* (unpublished), pl. C. fig. 4.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

**36679.** The right humerus.

*Presented by the Secretary of State for India, 1860.*

**39532.** The proximal extremity of the right humerus, exhibiting (*Fig.*) very clearly its characteristic form, which is essentially that of the humerus of a giraffe, and quite different from that of any Bovine ruminant. Figured by Falconer and Cautley, *loc. cit.* (unpublished), pl. C. fig. 5.

**39590.** An imperfect specimen of the proximal extremity of the right humerus.

**17109.** An imperfect specimen of the proximal extremity of the left humerus.

**17109 a.** The distal extremity of the left humerus.

**17109 b.** The distal extremity of the right humerus of a small specimen.

**39600.** The greater portion of the left fore limb of a small specimen, comprising the bones from the humerus to the metacarpus.

*Presented by General Sir W. E. Baker, K.C.B., 1848.*

**39600 a.** Casts of the bones of the right and left fore limbs, made from specimens in the Museum.

*Made under Dr. Falconer's superintendence.*

**39534.** The right radius and ulna. Figured by Falconer and Cautley, (*Fig.*) *loc. cit.* (unpublished), pl. C. fig. 6.

16213. The proximal extremity of the left radius and ulna. present
39535. The proximal portion of the left radius and ulna. specimen is of very large size.
16212. The proximal portion of a smaller left radius.
16214. The proximal part of the left radius.
- 16214 a. The proximal half of the right radius.
- 16214 b. The proximal extremity of the right radius.
39593. The left radius of a small Sivatheroid, differing from typical specimens belonging to the present species by the lateral compression of the distal extremity.
15708. The distal extremity of a very large left radius.
- 15708 a. The distal portion of a smaller left radius.
- 15708 b. The distal extremity of a similar left radius.
- 15708 c. The distal two-thirds of a still smaller left radius.
17092. A fragment, comprising the distal portion of the left radius, the carpus, and the proximal extremity of the metacarpus.
17115. The distal extremity of the left radius, with part of the proximal row of the carpus.
- 17092 c. The distal extremity of the right radius.
- 17092 d. The distal portion of the right radius.
39536. The left scaphoid.
39537. The left lunar.
39538. The right cuneiform.
- 17115 a. A smaller right cuneiform.
39539. The left magnum. It is probable that this specimen and (*Fig. ?*) the unciform No. 39540 are figured by Falconer and Cautley, *op. cit.* (unpublished), pl. C. fig. 11.
- 15695 a. A smaller left magnum.
15695. A still smaller left magnum.
39540. The left unciform.  
(*Fig. ?*)
- 17115 b. A smaller left unciform.

- 15288** The right metacarpus. This specimen is figured by Falconer and Cautley, *loc. cit.* (unpublished), pl. C. fig. 15; and is described and figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. pp. 134-5, pl. xvii. fig. 1. Its extreme length is 0,393.
- 17101.** The right metacarpus.
- 17089.** The right metacarpus, with the magnum of the carpus attached.
- 39605.** The right metacarpus.  
*Presented by General Sir W. E. Baker, K.C.B., 1848.*
- 39604.** The left metacarpus.  
*Presented by General Sir W. E. Baker, K.C.B., 1848.*
- 17102.** The left metacarpus.
- 17102 a.** The left metacarpus, of a slender type.
- 39603.** The left metacarpus, of a stout and massive type.  
*Presented by General Sir W. E. Baker, K.C.B., 1848.*
- 39541.** The proximal phalangeal of the left side of a foot. This (*Fig.*) specimen is figured by Falconer and Cautley, *loc. cit.* (unpublished), pl. C. fig. 16. A very similar specimen is figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. pl. xvii. fig. 9.
- 39530.** The proximal phalangeal of the left side of a foot. This (*Fig.*) specimen is considerably larger than the last. It is figured by Falconer and Cautley, *loc. cit.* (unpublished), pl. B. fig. 12.
- 15683.** The proximal phalangeal of the right side of a foot. This specimen is of a rather shorter type than No. 39541.
- 15683 c.** The proximal phalangeal of the right side of a foot.  
*Presented by R. A. C. Godwin-Austen, Esq.*
- 15683 d.** The proximal phalangeal of the right side of a foot.
- 15682.** The proximal phalangeal of the right side of a foot of a Sivatheroid. This bone is of a more slender type than either of the preceding.
- 15683 e.** The proximal phalangeal of the right side of a foot of a Sivatheroid, of a still more slender type.
- 15683 a.** The proximal phalangeal of the left side of a foot of a Sivatheroid. This specimen is small and slender, and may

perhaps belong to an immature individual of the present species.

- 15683 b.** A very similar phalangeal, showing evident signs of immaturity.
- 15683 f.** The proximal phalangeal of the right side of a foot, agreeing in general characters with the two preceding specimens.
- 39542.** The second phalangeal of the right side of a foot. This (*Fig.*) specimen is figured by Falconer and Cautley, *op. cit.* (unpublished) pl. C. fig. 17.
- 15805.** The second phalangeal of the left side of a foot. This (*Fig.*) specimen is slightly smaller than the last, and is figured by Falconer and Cautley, *op. cit.* (unpublished) pl. B. fig. 13; it precisely resembles in structure the corresponding bone of the Giraffe.
- 15806.** A similar second right phalangeal.
- 16394.** Another similar second phalangeal, imperfect proximally.
- 15804.** A similar phalangeal of the opposite side.
- 36681.** The terminal phalangeal of the left side of a foot. This (*Fig.*) specimen is figured by Falconer and Cautley, *op. cit.* (unpublished) pl. C. fig. 18. In its great lateral expansion, and in the absence of a sharp ridge dividing the anterior from the internal surface, it exactly agrees with the terminal phalangeal of the Giraffe, and differs very markedly from the corresponding bone of the *Bovidæ* and *Cervidæ*.
- Presented by the Secretary of State for India, 1860.*
- 39546.** The proximal extremity of the left femur. Figured by (*Fig.*) Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 1.
- 39546 a.** The distal portion of the right femur. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 3.
- 39547.** The distal extremity of the right femur. This specimen is (*Fig.*) of very large size, and is figured by Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 4.
- 17072 b.** The adjacent extremities of the associated left femur and tibia.
- 17072.** The left tibia. This specimen is figured by Falconer and (*Fig.*) Cautley, *op. cit.* (unpublished) pl. D. fig. 5.
- 17072 a.** The proximal portion of the left tibia.



- 16611.** The proximal portion of the right tibia. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 7.
- 18452.** The proximal extremity of the right tibia. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 6.
- 39549.** The distal portion of the left tibia. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 9.
- 39548.** The distal portion of the left tibia. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 8.
- 39578.** The distal portion of the right tibia, with part of the fibula and the astragalus attached. This is a small specimen.
- 17119.** The distal portion of the left tibia and the tarsus of a young individual.
- 39529.** The distal half of the right tibia and the tarsus of a young individual. This specimen is figured by Falconer and Cautley, *op. cit.* (unpublished) pl. B. fig. 11.
- 39543.** The distal portion of the right calcaneum. This specimen is figured by Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 12.
- 39543 a.** The greater part of the left calcaneum, with the outer lamina of the bone partly destroyed.
- 39543 b.** The distal portion of the right calcaneum, agreeing very closely with No. 39543.
- 16998.** The left astragalus. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 11.
- 17830.** The left astragalus, of a more elongated shape.
- 16998.** The left astragalus, of smaller size.
- 16998 a.** The right astragalus, of large size.
- 16998 b.** The right astragalus.
- 17794.** The right naviculo-cuboid.
- 18421.** The left naviculo-cuboid.
- 39544.** The right naviculo-cuboid. This specimen is figured by Falconer and Cautley, *op. cit.* (unpublished) pl. D. fig. 13.

**39752.** The left metatarsal, referred to this species by Falconer and (Fig.) Cautley, by whom it is figured, *op. cit.* (unpublished) pl. E. fig. 12. The present writer (Pal. Ind. ser. 10, vol. ii. p. 135) has suggested that this bone, owing to its great length in comparison to the metacarpus, may not belong to this species. In nearly all Ruminants (and notably in the allied *Giraffa* and *Helladotherium*) the length of the fore and hind cannon-bones is nearly the same; but in *Rangifer* the metatarsus is considerably the longer. The absence of another type of bone in the Siwalik Hills which could be considered as the metatarsus of *Sivatherium* countenances Falconer's view.

**17089.** The proximal two-thirds of a similar metatarsus; from the Pliocene of the Siwalik Hills.

**39753.** The proximal third of a somewhat larger metatarsus. (Fig.) Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. E. fig. 13.

**39526.** The inferior arch of the atlas vertebra. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. B. fig. 1.  
*Presented by Dr. Hugh Falconer.*

**39527.** The nearly complete atlas vertebra. Figured by Falconer (Fig.) and Cautley, *op. cit.* (unpublished) pl. B. fig. 2.

**15289 a.** The atlas, and centrum of the associated axis vertebra, in a somewhat damaged condition.

**39624.** The associated axis and the following cervical vertebræ. (Fig.) Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. B. fig. 4.

**39528.** The axis vertebra, nearly complete. Figured by Falconer (Fig.) and Cautley, *op. cit.* (unpublished) pl. B. fig. 3.

**16161.** The axis vertebra, wanting the greater part of the neural spine, and otherwise damaged.

**15289 b.** The axis vertebra of a small individual, wanting the neural spine.

**15297.** The sixth cervical vertebra, wanting the extremities of most of the processes. This specimen has a very indistinct hæmapophysial keel, and agrees very closely with the one figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. pl. xxii.

- 18173.** The sixth cervical vertebra, nearly complete. This specimen agrees with the last, and is figured by Falconer and Cautley, *op. cit.* (unpublished) pl. B. fig. 6.
- 18451.** The sixth cervical vertebra, wanting some of the processes. This and most of the succeeding specimens differ from the two preceding ones in possessing a well-marked hæmapophysial ridge.
- 16164.** The sixth cervical vertebra, somewhat damaged.
- 16225.** The sixth cervical vertebra. Figured by Cautley and Falconer, *op. cit.* (unpublished) pl. B. fig. 5.
- 16225 a.** The sixth cervical vertebra of a small individual.
- 15289 c, 15289 d, 15289 e.** Three imperfect specimens of the sixth cervical vertebra.
- 15707.** The nearly complete seventh cervical vertebra. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. B. fig. 7.
- 15289 f.** The seventh cervical vertebra. This specimen is in a somewhat damaged condition; the preaxial articulating condyle is considerably narrower than in the last specimen; analogous variations occur in the sixth cervical. An upper premolar tooth is wedged in beneath the left postzygapophysis.
- 17080.** An imperfect seventh cervical vertebra, agreeing in form with No. 15707.
- 15289 g.** An imperfect seventh cervical vertebra.
- 15297.** The first dorsal vertebra, wanting part of the neural spine. (Fig.) Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. B. fig. 8<sup>1</sup>. *Presented by Dr. Hugh Falconer.*
- 39591.** Four associated dorsal vertebræ. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. B. fig. 10.
- 15289 h.** An imperfect dorsal vertebra.
- 15289 i.** Part of the first and second sacral vertebræ.

<sup>1</sup> In the description of this plate ('Falconer's Palæontological Memoirs,' vol. i. p. 540) the number of this specimen is applied to the specimen represented in fig. 9, which does not appear to be in the Museum.

39754. The sternum. This specimen (which is figured by Falconer and Cautley, *op. cit.* (unpublished) pl. C. fig. 1) in its great lateral compression agrees with the sternum of the Giraffe, and differs from that of all the *Bovidæ* and *Cervidæ*. This specimen is also figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxi. fig. 5 (from the lateral aspect).

Genus **BRAMATHERIUM**, Falconer<sup>1</sup>.

There are two pairs of antlers, the anterior pair arising from a common base and being of large size. The molars are very similar in structure to those of *Sivatherium*.

**Bramatherium perimense**, Falconer<sup>2</sup>.

This is the only known species.

*Hab.* India.

20009. Cast of the cranium. The original is from the Pliocene Siwaliks of Perim Island, Gulf of Cambay, India, and is preserved in the Museum of the Royal College of Surgeons (No. 1436). It is described and figured by A. Bettington in the Journ. Roy. As. Soc. vol. viii. p. 340 (1845), and is noticed by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. p. 130.

*Presented by A. Bettington, Esq.*

48933. Fragment of the left maxilla, containing pm. 4 and the three true molars; from the Siwaliks of Perim Island. This specimen is the type, and is described and figured by Falconer in the Quart. Journ. Geol. Soc. vol. i. p. 363, pl. xiv. fig. 4, and is also figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xxxiii. figs. 3, 4. The premolar is much obscured by the matrix, and the outer half of m. 3 is broken away.

*Presented by Major Jervis.*

37259. Part of the left maxilla, showing the last five cheek-teeth, all more or less waterworn and battered; from the Siwaliks of Perim Island.

*Presented by Walter Ewer, Esq.*

37260. The hinder part of the right ramus of the mandible, containing m. 2 and m. 3, in a waterworn condition; from the Siwaliks of Perim Island.

*Presented by Walter Ewer, Esq.*



37261. Part of the left ramus of the mandible, showing  $\overline{m.1}$  and  $\overline{m.2}$ , and  $\overline{pm.4}$  half protruded : from the Siwaliks of Perim Island. This specimen agrees very closely with the one figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pl. vii. fig. 13.

*Presented by Walter Ewer, Esq.*

48453. Distal portion of the left radius of a large ruminant, in a waterworn condition ; from the Siwaliks of Perim Island.

*Presented by C. Falconer, Esq., 1867.*

40685. Proximal half of the left metacarpus of a large ruminant : from the Siwaliks of Perim Island. This specimen apparently indicates a bone of an elongated type ; and it is possible that both it and the last specimen may belong to *Giraffa*.

*Presented by C. Falconer, Esq., 1867.*

40892. Distal extremity of the right femur ; from the Siwaliks of Perim Island.

*Presented by C. Falconer, Esq., 1867.*

- 40892 a. The proximal extremity of the right tibia ; from the Siwaliks of Perim Island.

*Presented by C. Falconer, Esq., 1867.*

40686. A broken astragalus ; from the Siwaliks of Perim Island.

*Presented by C. Falconer, Esq., 1867.*

23150. A broken fifth cervical vertebra, probably belonging to the present species ; from the Siwaliks of Perim Island. This bone has very large articulating surfaces, and a short centrum, indicating a very short-necked animal.

*Presented by Dr. Beust, 1849.*

18788. The centrum of a seventh cervical vertebra, agreeing in size with the last specimen ; from the Siwaliks of Perim Island.

*Collected by Captain G. Fulljames.*

Genus **HELLADOTHERIUM**, Gaudry<sup>1</sup>.

There are no cranial appendages.

**Helladotherium duvernoyi** (Gaudry and Lartet<sup>2</sup>).

Syn. *Camelopardalis duvernoyi*, Gaudry and Lartet<sup>3</sup>.

This is the only known species.

*Hab.* S. Europe and India.

<sup>1</sup> Comptes Rendus, vol. li. p. 804 (1860).

<sup>2</sup> Comptes Rendus, vol. xliii. p. 274 (1856), *Camelopardalis*.

<sup>3</sup> *Loc. cit.*

- 39523.** Cranium, provisionally referred to the present species ; from (Fig.) the Pliocene of the Siwalik Hills, India. This specimen is figured by Falconer and Cautley in (unpublished) plate A. fig. 1 of the 'Fauna Antiqua Sivalensis' as a female *Sivatherium giganteum*. It is also figured by Rüttimeyer in the 'Natürliche Geschichte der Hirsche' pt. i. (Abh. schweiz. pal. Ges. 1880-3) pl. iii., under the provisional specific designation of *H. duvernoyi*. Its affinities are noticed by the writer in the 'Palæontologia Indica,' ser. 10, vol. ii. pp. 116-7.

*Cautley Collection. Presented, 1842.*

- 49717.** The right calcaneum ; from the Lower Pliocene of Pikermi, Attica. *Purchased, 1879.*

Genus **GIRAFFA**, Zimmermann<sup>1</sup>.

Syn. *Camelopardalis*, Gmelin<sup>2</sup>.

**Giraffa sivalensis** (Falconer and Cautley<sup>3</sup>).

Syn. *Camelopardalis sivalensis*, Falconer and Cautley<sup>4</sup>.

*Camelopardalis affinis*, Falconer and Cautley<sup>4</sup>.

*Hab.* India.

The reasons for referring all the remains of Siwalik Giraffes to the present species, and also for the serial position assigned to the vertebræ noticed below, are given by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. pp. 103-4.

- 39756.** The third right upper true molar ; from the Pliocene of the (Fig.) Siwalik Hills, India. This and the following specimens are the type of *C. affinis*; the present specimen is figured in the Proc. Geol. Soc. vol. iv. pl. ii. fig. 4, and in 'Falconer's Palæontological Memoirs,' vol. i. pl. xvi. fig. 6. More complete specimens of the dentition are figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. pl. xvi. *Cautley Collection. Presented, 1842.*

- 39756 a.** Fragment of the left maxilla, containing m. 2 and m. 3 ; (Fig.) from the Pliocene of the Siwalik Hills. Figured in the

<sup>1</sup> Geograph. Geschichte, vol. ii. p. 125 (1780).

<sup>2</sup> Syst. Nat. vol. i. p. 181 (1788).

<sup>3</sup> Proc. Geol. Soc. vol. iv. p. 244 (1843), *Camelopardalis*.

<sup>4</sup> *Loc. cit.*

<sup>5</sup> *Ibid.* p. 246.

Proc. Geol. Soc. vol. iv. pl. ii. fig. 3, and in 'Falconer's Palæontological Memoirs,' vol. i. pl. xvi. fig. 5.

*Cautley Collection. Presented, 1842.*

- 39755.** The third left lower true molar, in an early condition of wear; from the Pliocene of the Siwalik Hills. Figured in the Proc. Geol. Soc. vol. iv. pl. ii. fig. 5, and in 'Falconer's Palæontological Memoirs,' vol. i. pl. xvi. fig. 7.

*Cautley Collection. Presented, 1842.*

- 39757.** The fourth right lower premolar, in an almost unworn condition; from the Pliocene of the Siwalik Hills. Figured in the Proc. Geol. Soc. vol. iv. pl. ii. fig. 6, and in 'Falconer's Palæontological Memoirs,' vol. i. pl. xvi. fig. 8.

*Cautley Collection. Presented, 1842.*

- 39749.** The right humerus, wanting the proximal extremity, of a small individual; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley in (unpublished) plate E. fig. 3 of the 'Fauna Antiqua Sivalensis.'

*Cautley Collection. Presented, 1842.*

- 17136.** The proximal third of the left humerus; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*

- 17130.** Fragment of shaft of the left radius and ulna; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. E. fig. 4.

*Cautley Collection. Presented, 1842.*

- 39750.** The proximal half of the left metacarpus; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. E. fig. 6.

*Cautley Collection. Presented, 1842.*

- 39751.** Fragment of shaft of a metacarpus; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. E. fig. 7.

*Cautley Collection. Presented, 1842.*

- 17129.** Fragment of shaft of a metacarpus; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. E. fig. 8.

*Cautley Collection. Presented, 1842.*

- 17131.** Fragment of shaft of a metacarpus; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. E. fig. 9.

*Cautley Collection. Presented, 1842.*

- 17131 a. Two proximal phalangeals of the hind foot; from the Pliocene of the Siwalik Hills. These bones are almost indistinguishable from the corresponding bone of *Giraffa camelopardalis*. *Cautley Collection. Presented, 1842.*
- 17131 b. A proximal phalangeal, closely resembling the preceding specimens; from the Pliocene of the Siwalik Hills.  
*Cautley Collection. Presented, 1842.*
39746. The posterior moiety of the third cervical vertebra of a (Fig.) full-sized individual; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* (unpublished) pl. E. fig. 11 (as first cervical).  
*Cautley Collection. Presented, 1842.*
39747. The (probably) fifth cervical vertebra of a very small individual; from the Pliocene of the Siwalik Hills. This specimen, which is the type, is figured in the Proc. Geol. Soc. vol. iv. pl. iii.; in 'Falconer's Palæontological Memoirs,' vol. i. pl. xvi. figs. 1-4; and in plate E. fig. 1 of the 'Fauna Antiqua Sivalensis' (as third cervical).  
*Cautley Collection. Presented, 1842.*
39748. The posterior part of a much-battered fourth (?) cervical (Fig.) vertebra, intermediate in size between the two preceding specimens; from the Siwaliks of Perim Island, Gulf of Cambay. This specimen is figured by Falconer in the Quart. Journ. Geol. Soc. vol. i. pl. xiv. fig. 5, and by Falconer and Cautley in (unpublished) plate E. fig. 2 of the 'Fauna Antiqua Sivalensis.'  
*Cautley Collection. Presented, 1842.*

### Family CERVIDÆ.

*Dentition.* In living species of existing genera:— $I. \frac{0}{3}$ ,  $C. \frac{(0-1)}{1}$ ,  $Pm. \frac{3}{3}$ ,  $M. \frac{3}{3}$ . In the extinct genus *Amphitragulus*,  $\overline{pm. 1}$  is present.

There is very considerable difficulty in referring all the fossil species of this family to their proper genera. In the case of the living genera, those species whose affinities cannot be precisely determined are provisionally referred to the genus *Cervus*, which is taken to include the majority of the existing Deer of the Old World. The fossil Deer allied to the existing Muntjac (*Cervulus*) apparently indicate a complete transition to the genus *Palæomeryx*, in which, from the simple structure of its molars, is included the species termed by Hensel *Prox furcatus*, which may probably be regarded as an ances-



tral form of *Cervulus*. The members of the present family making the nearest approach to the *Giraffidæ* seem to be the larger species of *Palæomeryx* like *P. sivalensis*, whose molars resemble those of *Giraffa*, and *Alces*, in which the upper molars are very like those of *Vishnutherium*.

Genus **CARIACUS**, Gray<sup>1</sup>.

*Cariacus rufus* (F. Cuvier<sup>2</sup>).

Syn. *Cervus rufus*, F. Cuvier<sup>3</sup>.

*Coassus rufus*, Gray<sup>4</sup>.

*Hab.* Brazil.

18701. The hinder portion of the cranium of a female; from a cavern in Minas Geraes, Brazil. This species is doubtfully recorded by H. Gervais and Ameghino in 'Les Mammifères fossiles de l'Amérique méridionale,' p. 125 (1880) from the Pleistocene of Buenos Ayres on the evidence of limb-bones and fragments of the jaws.

*Claussen Collection. Purchased, 1848.*

Genus **CAPREOLUS**, Hamilton-Smith<sup>5</sup>.

*Capreolus caprea*, Gray<sup>6</sup>.

Syn. *Cervus capreolus*, Linn.<sup>7</sup>

*Capreolus fossilis*, H. v. Meyer<sup>8</sup>.

*Hab.* Europe and Western Asia.

39369. The frontals and antlers; from a Prehistoric (?) deposit in Clements Lane, Lombard Street, London.

*Purchased, 1865.*

41479. The calvarium of a young specimen; from the turbarry of Walthamstow, Essex.

*Purchased, 1869.*

40200. Two frontals and antlers; from a superficial deposit at Moorfields, London.

*Purchased, 1867.*

<sup>1</sup> Proc. Zool. Soc. 1850, p. 237.

<sup>2</sup> Dict. Sci. Nat. vol. vii. p. 485 (1817), *Cervus*. The writer follows Sclater ('List of Animals in Gardens of Zool. Soc.' 1883, p. 174) in placing this species in *Cariacus*.

<sup>3</sup> *Loc. cit.*

<sup>4</sup> List of Mammalia in British Museum, p. 174 (1843).

<sup>5</sup> In Griffith's 'Animal Kingdom,' vol. v. p. 313 (1827).

<sup>6</sup> List of Mammalia in British Museum, p. 176 (1843), *C. caprea*.

<sup>7</sup> Syst. Nat. ed. 12, vol. i. p. 94 (1766).

<sup>8</sup> Palæologica, p. 94 (1832).

39902. A shed antler ; from Reach Fen, Cambridgeshire.  
*Purchased, 1866.*

27510. The left frontal and antler ; dredged off Bawdsey.  
*Purchased, 1852.*

27513. Two frontals and antlers ; from a bog at Sutton, Essex.  
*Purchased, 1852.*

27888, 27889, 27890. Three frontals and antlers ; from a Prehistoric(?) deposit in London.

*Presented by John Brown, Esq. 1852.*

41371. The right frontal and antler ; from the turbarry of Walthamstow.  
*Purchased, 1869.*

18304. Fragment of a frontal and antler ; from a Pleistocene deposit, locality unknown.

*McEnery Collection. Purchased, 1842.*

16121. An imperfect shed antler ; from the Forest-bed of Ostend, Norfolk.  
*Green Collection. Purchased, 1843.*

22034, 28079. Three upper true molars, provisionally referred to this species ; from the Pleistocene of Grays, Essex.

23034, *purchased, 1848 ; 28079, Brown Collection, presented, 1852.*

20257, 21298, 21639, 24960, 28079 a. Various limb-bones provisionally referred to this species ; from the Pleistocene of Grays. 28079 a, *Brown Collection. The others purchased.*

41749, 41742. The left radius and the right metatarsus ; from the turbarry of Walthamstow.  
*Purchased, 1869.*

17743. The right metatarsus (imperfect distally) ; from the Pleistocene of Bacton, Norfolk.

*Green Collection. Purchased, 1843.*

### **Capreolus cusanus** (Croizet and Jobert<sup>1</sup>).

Syn. *Cervus cusanus*, Croizet and Jobert<sup>2</sup>.

Boyd-Dawkins (Quart. Journ. Geol. Soc. vol. xxxiv. p. 406 [1878]) regards this form as being almost certainly the ancestor of the living *C. caprea*.

*Hab.* France.

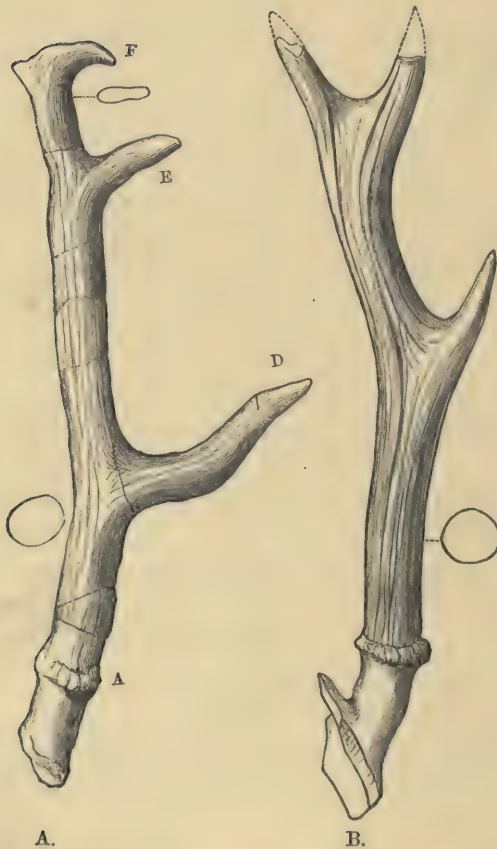
<sup>1</sup> Oss. Foss. d. Puy-de-Dôme, *Cervidæ*, pl. viii. (1828), *Cervus*. The names of the species figured in this part of the work were only given on the covers of the different fasciculi, which have in many instances been destroyed in binding.

<sup>2</sup> *Loc. cit.*

**34610.** The left antler and part of the frontal; from the Upper Pliocene of Ardé (Puy-de-Dôme), France. This specimen is figured by Boyd-Dawkins in the 'Quart. Journ. Geol. Soc.' vol. xxxiv. p. 405, fig. 2; the figure being reproduced in the accompanying woodcut (fig. 6, B).

*Bravard Collection. Purchased, 1852.*

Fig. 6.



- A Antler of *Capreolus matheroni*; from the Lower Pliocene of Cueuron.  
 B. Antler of *C. cusanus*; from the Upper Pliocene of Ardé.  $\frac{1}{2}$ . (From the Quart. Journ. Geol. Soc.)

**Capreolus matheroni** (P. Gervais<sup>1</sup>).

Syn. *Cervus matheroni*, P. Gervais<sup>2</sup>.

*Cervus bravardi*, Pomel and Bravard, MS.

Boyd-Dawkins regards this form as less specialized than the preceding species, of which it may be the ancestor. It has been considered by some writers as belonging to the axine group of *Cervus*.

*Hab.* France.

**34623.** An adult antler and pedicle ; from the Lower Pliocene of (Fig.) Cucuron (Vaucluse), France. This specimen is figured by Boyd-Dawkins in the 'Quart. Journ. Geol. Soc.' vol. xxxiv. p. 405, fig. 1 (1878) ; the figure being reproduced in the woodcut on page 76 (fig. 6, A).

*Bravard Collection. Purchased, 1852.*

**34624.** A very similar antler and pedicle ; from the Lower Pliocene of Cucuron. *Bravard Collection. Purchased, 1852.*

*From the small size of the above-noticed antlers, it is not improbable that the following specimens of teeth should be referred to the present species.*

**34625-34631.** A fragment of the right ramus of the mandible, with m. 2 and m. 3, and five detached lower molars ; from the Lower Pliocene of Cucuron.

*Bravard Collection. Purchased, 1852.*

*The following specimens from the same deposit indicate a larger animal, and were named in MS. by Bravard, C. cucuronis : they belong to the Bravard Collection, purchased, 1852.*

**34611-34614.** A fragment of the left maxilla, with pm. 4, m. 1, and m. 2, and three detached upper cheek-teeth.

**34615.** Part of the mandible, with the milk-dentition.

**34616.** Part of the right ramus of the mandible, with the six cheek-teeth (m. 2 imperfect).

**34617.** Fragment of the mandible, with one molar.

**34622, 34623.** Two specimens of the distal extremity of the humerus.

<sup>1</sup> Zool. et Pal. Françaises, 2nd ed. p. 148 (1859), *Cervus*. A reference is here given to Bull. Ac. Sci. Montpell. 1852, p. 10, which the writer cannot verify.

<sup>2</sup> *Loc. cit.*



Genus **ALCES**, Hamilton-Smith<sup>1</sup>.

**Alces machlis**, Ogilby<sup>2</sup>.

Syn. *Cervus alces*, Linn.<sup>3</sup>

*Hab.* Northern Europe, Asia, and America.

**15599.** The greater part of the right ramus of the mandible, with the last five cheek-teeth ; from a Pleistocene (?) deposit in North America. *Purchased*, 1843.

**41414, 41478.** The associated right humerus, radius, and ulna, and the left metacarpal ; from the turbarry of Walthamstow. These bones are referred to the present species on the authority of Owen, by whom they are noticed in the Geol. Mag. dec. 1, vol. vi. p. 389 (1869). *Purchased*, 1869.

**7912.** A left calcaneum, provisionally referred to this species ; from the Pleistocene of Big-Bone Lick, Kentucky, U.S.A. *Mantell Collection. Purchased*, 1836.

**Alces latifrons** (Johnson<sup>4</sup>).

Syn. *Cervus latifrons*, Johnson<sup>5</sup>.

*Cervus bovoides*, Gunn, MS.

*Hab.* England.

The antlers, according to Boyd-Dawkins, are less palmated than in the Elk.

**46111.** The base of an antler ; dredged on the Dogger Bank. *Owles Collection. Purchased*, 1874.

**33471.** The base of a smaller antler ; dredged off Happisburgh, Norfolk. *Layton Collection. Purchased*, 1858.

**46108.** The calvarium of a young individual, provisionally referred to this species ; dredged on the Dogger Bank. *Owles Collection. Purchased*, 1874.

<sup>1</sup> In Griffith's 'Animal Kingdom,' vol. v. p. 303 (1827).

<sup>2</sup> Proc. Zool. Soc. 1836, p. 135.

<sup>3</sup> Syst. Nat. Ed. 12, vol. i. p. 92 (1766).

<sup>4</sup> Ann. Mag. Nat. Hist. ser. 4, vol. xiii. p. 2 (1874), *Cervus*.

<sup>5</sup> *Loc. cit.*

Genus **RANGIFER**, Hamilton-Smith<sup>1</sup>.

**Rangifer tarandus** (Linn.<sup>2</sup>)

Syn. *Cervus tarandus*, Linn.<sup>3</sup>

*Cervus guettardi*, Desmarest<sup>4</sup>.

*Hab.* Northern Europe, Asia, and America.

Fig. 7.



*Cervus tarandus*. Cranium and antlers; from the Pleistocene of Bilney Moor, East Dereham. (From Owen's 'Palæontology'.)

**46102.** The broken calvarium; dredged on the Dogger Bank.

*Owles Collection. Purchased, 1874.*

**36746.** The broken calvarium; from a cavern at Berry Head, (Fig.) Devonshire. Figured by Owen in the 'British Fossil Mammals and Birds,' p. 481, fig. 198. *Purchased, 1858.*

**37306.** The broken calvarium; from Berry Head, Devonshire.

*Presented by Rev. H. F. Lyte, about 1860.*

<sup>1</sup> In Griffith's 'Animal Kingdom,' vol. v. p. 304 (1827).

<sup>2</sup> Syst. Nat. ed. 12, vol. i. p. 93 (1766), *Cervus*.

<sup>3</sup> *Loc. cit.*

<sup>4</sup> Mammalogie, p. 447 (1822).

- M. 1626.** The greater part of the right antler; from the Pleistocene of West Brompton, London. *Purchased, 1884.*
- 46104.** The nearly complete right antler; dredged on the Dogger Bank. *Owles Collection. Purchased, 1874.*
- 24362.** Three specimens of portions of antlers; from the Pleistocene of Kew, near London.  
*Presented by W. Layton, Esq., 1849.*
- 27666.** Three portions of antlers; from the Pleistocene of Neschers, France. *Croizet Collection. Purchased, 1848.*
- 16824, 16827.** Several fragments of antlers; from Kent's Cavern, Torquay, Devonshire.  
*McEnery Collection. Purchased, 1842.*
- 1 a (O. C.).** Portion of an antler; from a frozen Pleistocene deposit (Fig.) in Eschscholtz Bay, Kotzebue Sound, Alaska, U.S.A. Noticed and figured in F. W. Beechey's 'Voyage to the Pacific and Behring's Straits in H.M.S. 'Blossom,' during the years 1825 to 1828,' vol. ii. p. 593, pl. iii. (Fossils) fig. 11 (1831).  
*Presented by Captain F. W. Beechey, R.N.*
- M. 497.** Numerous portions of antlers and limb-bones; from the Pleistocene of "The Boltons," Old Brompton, London.  
*Presented by J. G. Spicer, Esq., 1883.*
- 44674.** Base of the antler of a young individual; from Banwell Cave, Somersetshire. *Presented by B. Bright, Esq., 1873.*
- 16736.** Fragment of the left maxilla with the three true molars; from Kent's Cavern.  
*McEnery Collection. Purchased, 1842.*
- 16741, 17990.** Fragments of the mandible; from Kent's Cavern.  
*McEnery Collection. Purchased, 1842.*
- 18982.** Two fragments of the mandible; from Kent's Cavern.  
*Presented by Rev. Upton Richards, 1845.*
- 16724, 16684.** Two portions of the mandible, in both of which  $\overline{\text{mm. 4}}$  is retained; said to be from "Anstie's Cave,"<sup>1</sup> near Torquay. *McEnery Collection. Purchased, 1842.*

<sup>1</sup> The writer is unacquainted with any cave of this name, although there is a small bay called "Anstie's Cove" not far from Kent's-Hole Cavern.

16808. Fragment of the left ramus of the mandible of a young individual, with  $\overline{\text{mm. 4}}$ , and  $\overline{\text{m. 1}}$  in alveolo, from Kent's Cavern; figured in McEnery's 'Cavern Researches,' pl. M. fig. 6. *McEnery Collection. Purchased, 1842.*
16818. Fragment of the left ramus of the mandible of a young individual, with the last two milk-molars and the first lobe of  $\overline{\text{m. 1}}$ ; from Kent's Cavern. Figured by McEnery, *op. cit.* pl. M. fig. 2. *McEnery Collection. Purchased, 1842.*
16893. Part of the left ramus of the mandible, with all the cheek-teeth except  $\overline{\text{pm. 2}}$ ; from Kent's Cavern. Figured by McEnery, *op. cit.* pl. M. fig. 3. *McEnery Collection. Purchased, 1842.*
46103. The greater part of the left ramus of a mandible provisionally referred to this species; dredged off the Dogger Bank. This specimen is remarkable in that the third lobe of  $\overline{\text{m. 3}}$  is almost entirely absent; other specimens (*e. g.* No. 18982) show that this lobe is frequently very small. *Owles Collection. Purchased, 1874.*
24376. Fragment of the right ramus of the mandible, with the three true molars; from the Pleistocene of Kew. *Presented by W. Layton, Esq., 1849.*
44675. The right humerus; from Banwell Cave. *Presented by B. Bright, Esq., 1873.*
18304. The distal half of the right humerus; from Kent's Cavern. *McEnery Collection. Purchased, 1842.*
16784. The left radius of a young individual; from Kent's Cavern. *McEnery Collection. Purchased, 1842.*
16886. The right metacarpus, of very large size; from Kent's Cavern. *McEnery Collection. Purchased, 1842.*
- 44676, 44680. Two specimens of the left metacarpus; from Banwell Cave. *Presented by B. Bright, Esq., 1873.*
- M. 2315. The left metacarpus; from the Pleistocene fissures of Oreston, near Plymouth, Devonshire. *No history.*
44377. The right calcaneum; from the Pleistocene of Kew. *Presented by W. Layton, Esq., 1849.*



44678. The left metatarsus ; from Banwell Cave.

*Presented by B. Bright, Esq., 1873.*

Genus **CERVUS**, Linn.<sup>1</sup>

Including *Megaceros*, Owen<sup>2</sup>.

*Strongyloceros*, Owen<sup>3</sup>.

*Eucladoceros*, Falconer<sup>4</sup>.

*A. Megacerotine Group.*

**Cervus giganteus** (Blumenbach<sup>5</sup>).

Syn. *Alces gigantea*, Blumenbach<sup>6</sup>.

*Cervus hibernus*, Desmarest<sup>7</sup>.

*Cervus megaceros*, Hart<sup>8</sup>.

*Megaceros hibernicus*, Owen<sup>9</sup>.

In this species, which is the one representative of the group, the antlers diverge at right angles to the frontal plane, are widely palmated, and have both a brow- and bez-tyne; in the adult the brow-tyne is expanded and bifurcate, and the same feature is occasionally met with in the bez-tyne. Antlers of three different ages are figured by Owen in the 'British Fossil Mammals and Birds,' p. 456.

*Hab.* Western Europe.

**M. 2322.** Skeleton, with the cranium of a male, made up from the remains of several individuals; from the Bog of Axe, near Enniscorthy, County Wexford, Ireland.

*Enniskillen Collection. Purchased, 1882.*

**15602 a (15282).** The skeleton of a male, made up from several individuals; from the Pleistocene of Ireland. The greater part of the skeleton was presented by Archdeacon Maunsell in 1843, but some bones were supplied from specimens presented by the Earl of Derby (then Lord Stanley) about 1840. The cranium (No. 15282) was received in exchange from the Rev. Mr. Mockler, and was substituted for the one belonging to the skeleton presented by Archdeacon Maunsell.

<sup>1</sup> Syst. Nat. ed. 12, vol. i. p. 92 (1766).

<sup>2</sup> Rep. Brit. Assoc. for 1843, p. 237 (1844).

<sup>3</sup> British Fossil Mammals and Birds, p. 469 (1846).

<sup>4</sup> Palæontological Memoirs, vol. ii. p. 472 (1868).

<sup>5</sup> Beiträg. z. Naturgeschichte, 1st French ed. vol. ii. p. 407 (1803), *Alce*.

<sup>6</sup> *Loc. cit.*

<sup>7</sup> Mammalogie, p. 446 (1822).

<sup>8</sup> Description of the Fossil Deer of Ireland (1826).

<sup>9</sup> Rep. Brit. Assoc. for 1843, p. 237 (1844).

Fig. 8.



*Cervus giganteus*.—Skeleton, from shell-marl beneath the peat, Ireland.

**15602 b.** The cranium and antlers ; from a bog in Ireland. This is the specimen properly belonging to the preceding skeleton.

*Presented by Archdeacon Maunsell, 1843.*

**M. 1126.** The cranium, with the lower halves of the antlers, together with the right ramus of the mandible and several limb-bones ; from the Pleistocene of Orłowschen, Goot, Malvarbraugelsk district, Russia. *Purchased, 1883.*

**41850.** The skeleton of a female ; from a bog in Ireland.

*Purchased, 1870.*

**M. 2323.** The cranium and antlers of a male ; from a bog in Ireland. *No history.*

- M. 2325.** The cranium and antlers of a male; from the Reg Bog, Dunshaughlin, Ireland.

*Presented by C. Falconer, Esq., 1867.*

- M. 2324.** The cranium and antlers of a male; from a bog in Ireland.

*No history.*

- 8085.** The cranium and antlers of a male; from a bog in Ireland.

*Mantell Collection. Purchased, 1836. (Labelled "formerly in Mr. Brooke's Museum.")*

- 14102.** The cranium of a male, with portions of the antlers; from a bog in Ireland.

*Presented by the Earl of Derby (then Lord Stanley), about 1840.*

- 14102.** The cranium of a male, with portions of the antlers; from a bog in Ireland.

*Presented by the Earl of Derby (then Lord Stanley), about 1840.*

- 32495.** The cranium of a male, with portions of the antlers; from a bog in Ireland.

*Presented by the Earl of Enniskillen, 1857.*

- 20601.** The frontlet and antlers of a male; from a bog in Ireland.

*Purchased, 1846.*

- 28968.** The cranium of a male, with the antlers shed; from a bog in Ireland.

*Purchased, 1854.*

- 46105.** The calvarium of a male; dredged on the Dogger Bank.

*Owles Collection. Purchased, 1874.*

- 32497.** The calvarium of a male; dredged off Harwich, Essex.

*Purchased, 1857.*

- 46107.** The frontlet of a male, with the bases of the antlers; dredged off the Dogger Bank.

*Owles Collection. Purchased, 1874.*

- M. 2340.** The right frontal, with the base of the antler; from an English Pleistocene deposit.

*No history.*

- M. 2326, M. 2328.** The cranium and mandible of a female; from a bog at Naul, County Dublin.

*No history.*

- M. 2327.** The cranium of a female, imperfect anteriorly; from a bog at Naul.

*No history.*

- 46106.** The upper portion of the cranium ; dredged on the Dogger Bank. *Owles Collection. Purchased, 1874.*
- 17471.** The palate ; showing all the cheek-teeth of both sides (*Fig.*) except pm. 2 ; from Kent's Cavern, Torquay, Devonshire. Noticed in Owen's 'British Fossil Mammals and Birds,' p. 467, and figured in McEnery's 'Cavern Researches,' pl. I. fig. 1. *McEnery Collection. Purchased, 1842.*
- M. 814.** The palate, showing all the cheek-teeth except the right pm. 4 and the left m. 3 ; from Kent's Cavern (3rd layer of cave-earth). *Presented by Lord Haldon, 1883.*
- M. 443.** Part of the right maxilla, containing all the cheek-teeth except pm. 2 ; from Kent's Cavern. *Enniskillen Collection. Purchased, 1882.*
- 16802, 16799, 18292, 18982.** Four fragments of right maxillæ, with cheek-teeth ; from Kent's Cavern.  
     16802, 16799, *McEnery Collection. Purchased, 1842.*  
     18292, 18982, *Presented by Rev. U. Richards, 1845.*
- 17949, 17950.** Two left upper true molars ; from Kent's Cavern. *McEnery Collection. Purchased, 1842.*
- 23134.** A right upper true molar ; from the Pleistocene of Grays, Essex. *Purchased, 1849.*
- 18781.** Fragment of the right maxilla, showing the six cheek-teeth in an early stage of wear ; from a bog in Ireland. *Purchased, 1845.*
- 237 (O. C.).** Fragment of the right maxilla, containing two true molars in a much-worn condition ; from Kirkdale Cave, Yorkshire. *Presented by W. Salmond, Esq. Before 1836.*
- 16742, 18982.** Three upper premolars ; from Kent's Cavern. *McEnery Collection. Purchased, 1842.*
- M. 2332.** The basal half of the left antler of a very large individual ; from the Pleistocene of Walton-on-the-Naze, Essex. Noticed in Owen's 'British Fossil Mammals and Birds,' p. 466. *Presented by John Brown, Esq., 1852.*
- 27977.** Two specimens of the base of the antler of opposite sides ; from the Pleistocene of Walton. *Presented by John Brown, Esq., 1852.*



16827. Three specimens of the base of the antler; from Kent's Cavern. *McEnery Collection. Purchased, 1842.*
- M. 388. The base of the right antler; from a bog in Ireland. *Egerton Collection. Purchased, 1882.*
26124. Two rami of the mandible; from a bog in Ireland. *Purchased, 1851.*
- M. 2329. The left ramus of the mandible; from a bog in Ireland. *No history.*
- M. 365. The left ramus of the mandible; from a bog in Ireland. *Enniskillen Collection. Purchased, 1882.*
- M. 2330. The right ramus of the mandible; from a bog in Ireland. *No history.*
- M. 2331. Part of the right ramus of the mandible, showing four cheek-teeth; from a bog in Ireland. *No history.*
45324. Part of the right ramus of the mandible, showing  $\overline{m. 2}$  and  $\overline{m. 3}$ ; from the Pleistocene of Ilford, Essex. *Brady Collection. Purchased, 1878.*
45325. Part of the right ramus of the mandible, with the last four cheek-teeth; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- M. 623. Part of the right ramus of the mandible, with the last four cheek-teeth; from Kent's Cavern (first layer of cave-earth). *Presented by Lord Haldon, 1883.*
- 16820 b. The dental series of the left ramus of the mandible; (*Fig.*) from Kent's Cavern. Figured in McEnery's 'Cavern Researches,' pl. K. fig. 4. *McEnery Collection. Purchased, 1842.*
16800. Part of the left ramus of the mandible; from Kent's (*Fig.*) Cavern. Figured by McEnery, *op. cit.* pl. K. fig. 5. *McEnery Collection. Purchased, 1842.*
- M. 690. The greater part of the left ramus of the mandible, with the cheek-teeth in a much-worn condition; from Kent's Cavern (2nd layer of cave-earth). *Presented by Lord Haldon, 1883.*
- M. 691. Fragment of the left ramus of the mandible, with the three

true molars ; from Kent's Cavern (2nd layer of cave-earth).  
*Presented by Lord Haldon, 1883.*

**M. 692.** Part of the left ramus of the mandible, with the last four cheek-teeth ; from Kent's Cavern (2nd layer of cave-earth).  
*Presented by Lord Haldon, 1883.*

**M. 689.** Fragment of the left ramus of the mandible of a young individual, showing  $\overline{\text{mm. 4}}$  and  $\overline{\text{m. 1}}$  ; from Kent's Cavern (2nd layer of cave-earth).  
*Presented by Lord Haldon, 1883.*

**16818, 18982.** Two fragments of the mandible ; from Kent's Cavern.  
 16818, *McEnery Collection. Purchased, 1842.*  
 18982, *Presented by the Rev. U. Richards, 1845.*

**232 (O. C.).** Fragment of the right ramus of the mandible containing  $\overline{\text{m. 3}}$  ; from Kirkdale Cave.  
*Presented by W. Salmond, Esq. Before 1836.*

**18808, 21297.** Two portions of opposite rami of the mandible, each with the three true molars ; from the Pleistocene of Grays.  
*Purchased, 1845 & 1847.*

**28990, 39508.** Two fragments of mandibles provisionally referred to this species ; dredged on the Dogger Bank.  
*Owles Collection. Purchased, 1874.*

**M. 2323.** The left scapula ; from a bog in Ireland. *No history.*

**39269.** The right humerus ; from a bog near Loughgur, County Limerick, Ireland. *Presented by the Count de Salis, 1865.*

**M. 2334.** The left humerus ; from a bog in Ireland. *No history.*

**21682.** The proximal half of the left humerus ; from the Pleistocene of Ilford.  
*Purchased, 1848.*

**45328.** The distal half of the right humerus ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*

**14151.** The right radius and ulna ; from a bog in Ireland.  
*Presented by the Earl of Derby (then Lord Stanley).  
 About 1840.*

**M. 2335.** The left radius and ulna ; from a bog in Ireland.  
*No history.*

**45330.** The left scaphoid ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*

18086. Two specimens of the right metacarpus ; from a bog in Ireland. *Purchased, 1842.*
- 241 (O. C.). A right metacarpus, provisionally assigned to the present species ; from Kirkdale Cave, Yorkshire.  
*Presented by W. Salmond, Esq. Before 1836.*
- M. 982. The left metacarpus ; from Kent's Cavern (4th layer of cavern-earth). *Presented by Lord Haldon, 1883.*
- M. 2337. The pelvis ; from a bog in Ireland. *No history.*
14157. The right femur ; from a bog in Ireland.  
*Presented by the Earl of Derby (then Lord Stanley).  
About 1840.*
- M. 2336. The left femur ; from a bog in Ireland. *No history.*
14153. The left tibia ; from a bog in Ireland.  
*Presented by the Earl of Derby (then Lord Stanley).  
About 1840.*
39270. The left tibia ; from a bog near Loughgur.  
*Presented by the Count de Salis, 1865.*
16883. The right tibia, imperfect proximally ; from Kent's Cavern.  
*McEnery Collection. Purchased, 1842.*
18085. The left metatarsus ; from a bog in Ireland.  
*Purchased, 1842.*
49438. The left metatarsus ; from the Pleistocene of the Eastern Counties. *Purchased, 1878.*
28576. The left metatarsus ; from a cavern in Sundwig, Westphalia.  
*Purchased, 1853.*
- M. 2338, M. 2339. Two specimens of the astragalus ; from a bog in Ireland. *No history.*
20244. The right astragalus ; from the Pleistocene of (? Ilford) Essex. *Purchased, 1846.*
27947. The right astragalus ; from the Pleistocene of Walton.  
*Presented by John Brown, Esq., 1852.*
20242. The right calcaneum ; from the Pleistocene of (? Ilford) Essex. *Purchased, 1846.*
- 16839 a. The left calcaneum ; from Kent's Cavern.  
*McEnery Collection. Purchased, 1842.*

18151. The left calcaneum ; from a bog in Ireland.

*Purchased, 1842.*

20241, 23149. Two first phalangeals ; the former from the Pleistocene of Grays, the latter from that of Ilford. *Purchased.*

18304. An imperfect atlas vertebra ; from Kent's Cavern.

*McEnery Collection. Purchased, 1842.*

14160. The 1st, 2nd, 3rd, 4th, 6th, and 7th cervical vertebræ ; from a bog in Ireland.

*Presented by the Earl of Derby (then Lord Stanley). About 1840.*

M. 2341. The sixth cervical vertebra ; from a bog in Ireland.

*Presented by John Brown, Esq., 1852.*

14162, 14163. Two early dorsal vertebræ ; from a bog in Ireland.

*Presented by the Earl of Derby (then Lord Stanley). About 1840.*

### B. *Damine Group.*

Both the brow- and bez-tyne are present, and the upper half of the antlers is broadly palmate : there may be a third tyne between the bez and the palmation.

### *Cervus dama*, Linn.<sup>1</sup>

Syn. *Dama vulgaris*, Gray<sup>2</sup>.

*Hab.* South-eastern Europe and South-western Asia.

M. 47646. Mass of ossiferous breccia containing part of the right (*Fig.*) ramus of the mandible and several limb-bones, provisionally referred to this species ; from a cavern at Poco Roco, Gibraltar. This specimen is described and figured by Busk in the Trans. Zool. Soc. vol. x. pp. 114, 115, pl. xix. ; its right to distinction from the next species cannot be determined. *Brome Collection. Presented, 1876.*

### *Cervus browni*, Boyd-Dawkins<sup>3</sup>.

Syn. *Cervus clactonianus*, Falconer<sup>4</sup>.

This species, or variety, is closely allied to *C. dama*, from which it is distinguished merely by the presence of a third tyne above the bez ; according to Victor Brooke a similarly placed tyne occasionally

<sup>1</sup> Syst. Nat. ed. 12, vol. i. p. 93 (1766).

<sup>2</sup> List of Mammalia in British Museum, p. 181 (1843).

<sup>3</sup> Quart. Journ. Geol. Soc. vol. xxiv. p. 511 (1868).

<sup>4</sup> Falconer's Palæontological Memoirs, vol. ii. p. 479 (1868).



occurs in *C. dama*, which may perhaps be regarded as an instance of reversion.

*Hab.* England.

- 27926.** Lower part of the right antler of a young specimen ; from (Fig.) the Pleistocene of Clacton, Essex. This and the following figured specimens are the types ; the present one is figured by Boyd-Dawkins in the Quart. Journ. Geol. Soc. vol. xxiv. pl. xvii. fig. 1.

*Presented by John Brown, Esq., 1852.*

- 37778 a.** Lower part of a larger right antler, with the brow-tyne (Fig.) broken off ; from the Pleistocene of Clacton. Figured, loc. cit. fig. 2.

*Brown Collection. Presented by Sir R. Owen, K.C.B., 1858.*

- 37778 b.** Lower part of a similar right antler ; from the Pleistocene (Fig.) of Clacton. Figured, loc. cit. fig. 3.

*Brown Collection. Presented by Sir R. Owen, K.C.B., 1858.*

- 37778 c.** Lower half of a larger right antler, showing the brow- and (Fig.) part of the bez-tyne ; from the Pleistocene of Clacton. Figured, loc. cit. fig. 5.

*Brown Collection. Presented by Sir R. Owen, K.C.B., 1858.*

- 37778 d.** Base of a still larger right antler ; from the Pleistocene (Fig.) of Clacton. Figured, loc. cit. fig. 6.

*Brown Collection. Presented by Sir R. Owen, K.C.B., 1858.*

- 27876.** The nearly complete right antler of a full-grown animal ; (Fig.) from the Pleistocene of Clacton. Figured, loc. cit. fig. 4.

*Presented by John Brown, Esq., 1852.*

- 27883.** The lower half of a right antler ; from the Pleistocene of (Fig.) Clacton. Figured, loc. cit. pl. xviii. fig. 1.

*Presented by John Brown, Esq., 1852.*

- 27966.** The base of a right antler ; from the Pleistocene of Clacton. (Fig.) Figured, loc. cit. pl. xviii. fig. 2.

*Presented by John Brown, Esq., 1852.*

- 33778 e.** Fragment of the crown of an antler ; from the Pleistocene (Fig.) of Clacton.

*Brown Collection. Presented by Sir R. Owen, K.C.B., 1858.*

- 49443, 49444.** Two imperfect antlers, with fragments of the frontals ; from the Pleistocene of the Eastern coast.

*Purchased, 1878.*

*The Museum possesses a large series of antlers from Clacton which have not been catalogued. The reference of the following specimens is provisional.*

**28012 a.** The right radius; from the Pleistocene of Clacton.

*Presented by John Brown, Esq., 1852.*

**28037.** The atlas vertebra; from the Pleistocene of Clacton.

*Presented by John Brown, Esq., 1852.*

***Cervus falconeri*, Boyd-Dawkins<sup>1</sup>.**

This species is allied to the preceding, but the antlers are much less palmated.

*Hab.* England.

**33507.** The greater part of the left antler, with the tynes broken (Fig.) off; from the Norwich Crag. This specimen is the type, and is figured by Boyd-Dawkins in the Quart. Journ. Geol. Soc. vol. xxiv. pl. xviii. figs. 9-11. *Purchased, 1858.*

**35857.** Base of an antler; from the Red Crag of Suffolk. This (Fig.) specimen is figured by Boyd-Dawkins, *loc. cit.* fig. 12.

*Presented by J. Berners, Esq., 1861.*

**33512.** The broken pedicle and base of an antler provisionally referred to this species; from the Norwich Crag.

*Purchased, 1858.*

**48963.** Base of an antler; from the Red Crag of Suffolk.

*Purchased, 1878.*

**M. 1898.** Base of an antler, provisionally referred to this species; from the Red Crag of Suffolk.

*Presented by Sir R. Owen, K.C.B., 1884.*

**41243.** The distal extremity of a tibia, which may perhaps belong to this species; from the Norwich Crag of Thorpe, Norwich.

*Purchased, 1869.*

***Cervus savini*, Boyd-Dawkins<sup>2</sup>.**

This species is regarded by its founder as an ancestral form of *C. browni*.

*Hab.* England.

<sup>1</sup> Quart. Journ. Geol. Soc. vol. xxiv. p. 517 (1868).

<sup>2</sup> Proc. R. Soc. vol. xxxviii. p. 345 (1885).

- 33471 b.** Fragment of the right frontal and the base of the antler; probably dredged off Happisburgh, Norfolk.

*Layton Collection. Purchased, 1858.*

***Cervus verticornis*, Boyd-Dawkins<sup>1</sup>.**

This species is regarded as an aberrant form of the present group. The antlers are very short and thick, and set obliquely on the frontals; the brow-tyne is cylindrical, and downwardly curved, and above it there are two oval tynes; the beam is at first cylindrical, then becomes flattened, and above the third tyne is expanded into a crown with two points. The second tyne is in a different plane from the brow-tyne.

*Hab.* England.

- 49429.** The calvarium with the bases of the antlers; (?) from the Forest-bed of Norfolk. *Purchased, 1878.*

- 49430.** The frontals and the bases of the antlers; from the Forest-bed of the Eastern coast. *Purchased, 1878.*

- 33471 c.** Portion of the frontals, provisionally referred to this species; dredged off Happisburgh, Norfolk.

*Layton Collection. Purchased, 1858.*

- 49431.** The basal half of the left antler; from the Forest-bed of the Eastern coast. *Purchased, 1878.*

- 49432.** Part of the right frontal and the basal half of the antler; from the Forest-bed of the Eastern coast.

*Purchased, 1878.*

- 49433.** Part of the left frontal, with the base of the antler; from the Forest-bed of the Eastern coast. *Purchased, 1878.*

- 49434.** The basal half of the left antler; from the Forest-bed of the Eastern coast. *Purchased, 1878.*

- 49435.** The middle portion of the right antler; from the Forest-bed of the Eastern coast. *Purchased, 1878.*

- 49436.** The basal portion of the left antler; from the Forest-bed of the Eastern coast. *Purchased, 1878.*

- 49437.** Part of the left frontal, with the base of the antler; from the Forest-bed of the Eastern coast. *Purchased, 1878.*

<sup>1</sup> Quart. Journ. Geol. Soc. vol. xxviii. p. 406 (1872).

45929. The greater part of the beam of the left antler; from the Red Crag of Trimley, near Felixstowe, Suffolk.

*Purchased, 1874.*

40835. Cast of the basal half of the left antler. The original was in the collection of the Rev. J. Gunn of Irstead, and was obtained from the Forest-bed; it is now in the Norwich Museum. It is noticed in 'Falconer's Palæontological Memoirs,' vol. ii. p. 479 (no. *b*); and figured by Boyd-Dawkins, *op. cit.* p. 407, fig. 2.

*Presented by C. Falconer, Esq., 1867.*

- 33471 d. Three fragments of antlers; dredged off Happisburgh, Norfolk.

*Layton Collection. Purchased, 1858.*

*The following specimens came from the same deposit, but appear to indicate a smaller form.*

43481. Cast of part of a left maxilla, showing all the cheek-teeth except pm. 2. The original was obtained from the Forest-bed of Cromer, Norfolk.

*Presented by Professor Boyd-Dawkins, 1872.*

49440. Part of the right ramus of a mandible with  $\overline{m. 2}$  and  $\overline{m. 3}$ ; from the Pleistocene of the Eastern coast. The ramus is stouter and the molars thicker than in *C. elaphus*.

*Purchased, 1878.*

49439. The right metatarsus; from the Pleistocene of the Eastern coast. This bone is considerably larger than the metatarsus of *C. elaphus*.

*Purchased, 1878.*

33195. The left metatarsus; from the Pleistocene of Easton Cliff, Suffolk.

*Purchased.*

- 33471 e. The left metatarsus; dredged off Happisburgh, Norfolk.

*Layton Collection. Purchased, 1858.*

#### *C. Eucladocerotine Group.*

#### **Cervus sedgwicki**, Falconer<sup>1</sup> (*ex* Gunn, MS.).

Syn. *Cervus dicranios*, Nesti, MS.

The antlers of this species are more complex than those of any other Deer, living or extinct. Falconer describes them as having

<sup>1</sup> 'Falconer's Palæontological Memoirs,' vol. ii. p. 472 (1868).



a prominent burr, without obliquity; beam cylindrical, and straight at the base, compressed upwards, giving from its anterior margin three subequidistant tynes, which from the summit downwards are successively bi-, tri-, and quadrifurcate. Tynes long, straight, and conical, diverging in the same vertical plane. An antler is figured in 'Falconer's Palæontological Memoirs,' vol. ii. pl. xxxvii. fig. 1.

*Hab.* Europe.

**33471 f.** Middle portion of an antler; from the Forest-bed of Norfolk.  
*Layton Collection. Purchased, 1858.*

**33471 g.** Base of an antler; from the Forest-bed of Norfolk.  
*Layton Collection. Purchased, 1858.*

**33471 h.** Portion of an antler, provisionally regarded as belonging to a young individual of the present species; from the Forest-bed of Norfolk. *Layton Collection. Purchased, 1858.*

#### D. *Elaphine Group.*

Antlers rounded, bez-tyne present.

#### *Cervus elaphus*, Linn.<sup>1</sup>

*Syn. Strongyloceros spelæus*, Owen<sup>2</sup>.

*Cervus barbarus*, Gray<sup>3</sup> (*ex* Bennett, MS.).

*Hab.* Europe, Western Asia, and North Africa.

**M. 393.** The skull and antlers (with nine tynes); from the Pleistocene of Ireland. *Egerton Collection. Purchased, 1882.*

**M. 392.** The antlers of a very old individual; from the bed of the Lake of Toberseanovan, County Sligo, Ireland<sup>4</sup>. The specimen is noticed and the right antler figured in Owen's 'British Fossil Mammals and Birds,' pp. 472, 478, fig. 196; the figure being reproduced in the accompanying woodcut (fig. 9). The length of each antler is 30 inches, and each gives off fifteen tynes.

*Egerton Collection. Purchased, 1882.*

<sup>1</sup> *Syst. Nat.* ed. 12, vol. i. p. 93 (1766).

<sup>2</sup> 'British Fossil Mammals and Birds,' p. 469 (1846).

<sup>3</sup> *Proc. Zool. Soc.* 1850, p. 227.

<sup>4</sup> This is the locality given in Egerton's MS. Catalogue of his Collection. Owen gives the bed of the River Boyne, Drogheda.

Fig. 9.



*Cervus elaphus*.—The right antler; from the Lake of Toberscanovan.  
(From Owen's 'Palæontology'.)

- M. 31.** The antlers (with five tynes) together with part of the cranium, and a considerable portion of the skeleton; from the turbarry of Edmundsea, near Waltham Abbey, Essex.

*Presented by Major Tovey, R.E., 1880.*

- 41185.** An imperfect cranium, with the lower halves of the antlers; from the turbarry of Walthamstow, Essex.

*Purchased, 1869.*

- 32744.** The left antler attached to a fragment of the frontal; from the Pleistocene of Jarrow, Durham.

*Presented by Messrs. Harrison and Hodgson, 1857.*

- 45335.** The right antler, of enormous size, and bearing 9 or 10 tynes; from the Pleistocene of Ilford, Essex.

*Brady Collection. Purchased, 1878.*

- 45336.** The right antler of an immature individual, with 6 tynes (the bez broken off); from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

- 45338.** The basal half of the right antler; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

- 45339.** The basal half of the left antler; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 45340.** The basal portion of the left antler; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 23728 a.** The base of the left antler, with a part of the frontal; from the Pleistocene of Slade Green, Erith, Kent. *Purchased, 1849.*
- 23122.** The basal half of the left antler of an adult; from the Pleistocene of Maidstone, Kent. *Purchased, 1849.*
- 28533.** Basal half of the right antler of a small individual; from (*Fig.*) the Pleistocene of Selsey, Sussex. Figured in Dixon's 'Geology of Sussex,' p. 16, fig. 4 (1852). *Purchased.*
- 16820 a.** The base of the right antler, with the brow- and bez- (*Fig.*) tyne's broken off, of very large size; from Kent's Cavern, Torquay, Devonshire. This specimen is described and figured in Owen's 'British Fossil Mammals and Birds,' p. 469, fig. 193, under the name of *Strongyloceros spelæus*, of which it is the type; and also in McEnery's 'Cavern Researches,' pl. H. fig. 3. It measures 15 inches in circumference, and is equal in size to the largest antlers of *C. canadensis*, with which it is compared by Owen. *McEnery Collection. Purchased, 1842.*
- 16820-23.** Several specimens of the base of antlers, of very large size; from Kent's Cavern. *McEnery Collection. Purchased, 1842.*
- 232 (O. C.).** Base of the right antler; from Kirkdale Cave, Yorkshire. *Presented by W. Salmond, Esq. Before 1836.*
- 46851.** Base of a malformed right antler; from the Pleistocene of Greenwich, Kent. *Purchased, 1875.*
- 27967.** Lower part of a small left antler; from the Pleistocene of Walton, Essex. *Presented by John Brown, Esq., 1852.*
- 47405.** The lower half of a small right antler; from the Pleistocene of Ilford. *Presented by Mr. Rawkins, 1876.*
- 45379.** Fragment of the frontal and antler of a very young individual; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*

- 27624.** The lower part of a very small right antler; from the Pleistocene (?) of La Combette, near Champeix (Puy-de-Dôme), France. *Croizet Collection. Purchased, 1848.*
- M. 390.** The greater part of the left antler; from a superficial deposit at Saltersford, Nottinghamshire. *Egerton Collection. Purchased, 1882.*
- 28254.** The greater part of the right antler; from the Pleistocene (?) of Woodbridge, Suffolk. The specimen is labelled "from the Red Crag," but this is not borne out by its condition. *Presented by John Brown, Esq., 1852.*
- M. 389.** The basal half of a right antler, provisionally referred to this species; from a Pleistocene deposit near Norwich. *Egerton Collection. Purchased, 1882.*
- 47590.** Portions of antlers; from the caverns of Gibraltar. Several of the specimens (which are noticed in the sequel) from the same locality have been described and figured by Busk in the Trans. Zool. Soc. vol. x. under the name of *Cervus barbarus*. *Brome Collection. Presented, 1876.*
- 47491, 47492.** Portions of the cranium; from the caverns of Gibraltar. *Brome Collection. Presented, 1876.*
- 41980.** The calvarium; dredged from the bed of the Thames off Erith, Kent. *Purchased, 1870.*
- 27884.** The calvarium, with the bases of the antlers; from the Pleistocene of Colchester, Essex. *Presented by John Brown, Esq., 1852.*
- 23148.** Fragment of the frontals, provisionally referred to this species; from the Pleistocene of Grays, Essex. *Purchased, 1849.*

*In addition to the preceding specimens, the Museum also contains a large series of detached antlers from turbary and Pleistocene deposits, of which the following may be noticed:—*

**7396**, from Lewes, Sussex (*Mantell Collection. Purchased, 1836*).—**16081**, from Wellingborough, Northampton (*Purchased, 1842*).—**27624 a**, from La Combette, near Champeix, Puy-de-Dôme, France (*Croizet Collection. Purchased, 1848*).—**33471**, probably from Norfolk (*Layton Collection. Purchased, 1858*).—**36560**, from Grundisburgh, Suffolk (*Purchased, 1853*).—**36752**, from



Hammersmith (*Purchased*, 1862): this specimen is a very fine antler just out of the 'velvet.'—41415, 41492, 41494, from Walthamstow, Essex (*Purchased*, 1869).

*The specific reference of some of the following specimens must be considered as provisional. (See also Addenda.)*

20277. The associated upper cheek-teeth (wanting the right pm. 3 and m. 3 of both sides); from the Pleistocene of Grays.

*Purchased*, 1846.

18809, 21296, 21643, 22034, 28079. Numerous specimens of upper true molars; from the Pleistocene of Grays.

*Purchased*.

47593-94. Several portions of the maxillæ, with the cheek-teeth; from the caverns of Gibraltar.

*Brome Collection. Presented*, 1876.

19843. The greater part of the right ramus of the mandible, with the six cheek-teeth; from the Pleistocene of Grays.

*Purchased*, 1846.

21675. Two specimens of portions of the left ramus of the mandible, with the cheek-teeth; from Grays.

*Purchased*, 1848.

21678. Part of the left ramus of the mandible, with all the cheek-teeth except pm. 2; from Grays.

*Purchased*, 1848.

23731. Part of the right ramus of the mandible, showing mm. 3, mm. 4, and m. 1; from Grays.

*Purchased*, 1849.

38582. The left ramus of the mandible, with the teeth in a much-worn condition; from 'No-Man's-land shoal,' off the Isle of Wight.

*Presented by J. Harris, Esq.*, 1862.

39901. The right ramus of the mandible of a young individual, showing the three milk-molars; from Reach Fen, Cambridgeshire.

*Purchased*, 1866.

16820 b. Part of the left ramus of the mandible of a very large (*Fig.*) individual, containing all the cheek-teeth except pm. 2; from Kent's Cavern. Figured in McEnery's 'Cavern Researches,' pl. K. fig. 5.

*McEnery Collection. Purchased*, 1842.

- 47596.** Several imperfect rami of the mandible ; from the caverns (Fig.) of Gibraltar. Two are figured by Busk in the Trans. Zool. Soc. vol. x. pl. xxi. figs. 1, 2.

*Brome Collection. Presented, 1876.*

- 47597, 47598.** Numerous detached molars ; from the caverns of Gibraltar.

*Brome Collection. Presented, 1876.*

- 45334.** The third right lower true molar ; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

- 47604.** Portions of the scapula ; from the caverns of Gibraltar. (Fig.) One is figured by Busk, *op. cit.* pl. xxi. fig. 5.

*Brome Collection. Presented, 1876.*

- 47605-07.** Several imperfect specimens of the humerus ; from the caverns of Gibraltar.

*Brome Collection. Presented, 1876.*

- 45386.** The right humerus, wanting the head ; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

- 20253.** The right humerus ; from the Pleistocene of Grays.

*Purchased, 1846.*

- 16859.** The distal portion of the right humerus ; from the Pleistocene of Ilford.

*Presented by W. Thompson, Esq., 1842.*

- 24379.** The right humerus (imperfect proximally) ; from the Pleistocene of Kew. This specimen is smaller than the preceding.

*Presented by T. Layton, Esq., 1849.*

- 39760.** The distal portion of the left humerus ; from a superficial deposit at Bodelwyddan, near St. Asaph.

*Presented by W. M. Crowther, Esq., 1857.*

- 45354.** The right radius and part of the ulna, of large size ; from the Pleistocene of Ilford.

*Brady Collection. Purchased, 1878.*

- 23741 e.** The right radius and part of the ulna ; from the Pleistocene of Grays.

*Purchased, 1848.*

- 24381.** The left radius and ulna, of rather smaller size ; from the Pleistocene of Kew.

*Presented by T. Layton, Esq., 1849.*

- 20262.** The right radius and part of the ulna ; from the Pleistocene of Grays.

*Purchased, 1846.*

- 23763 q.** The left radius ; from the Pleistocene of Grays.  
*Purchased, 1848.*
- 20264.** The left radius ; from the Pleistocene of Grays.  
*Purchased, 1846.*
- 39761.** The proximal portion of the left radius : from a superficial deposit at Bodelwyddan.  
*Presented by W. M. Crowther, Esq., 1857.*
- 18840.** The proximal half of the left radius ; from the Pleistocene of Grays.  
*Purchased, 1845.*
- 45355, 45356.** Two specimens of the distal extremity of the left radius, of large size ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 47607-47611.** Several specimens of the radius and ulna ; one radius (*Fig.*) (No. 47608) figured by Busk, *op. cit.* pl. xxi. fig. 3 ; from the caverns of Gibraltar. *Brome Collection. Presented, 1876.*
- 45357.** The right metacarpus, of large size ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 7575.** A smaller right metacarpus ; from the Pleistocene of Lewes, Sussex.  
*Mantell Collection. Purchased, 1836.*
- 23125.** The right metacarpus ; from the Pleistocene of Maidstone, Kent.  
*Purchased, 1849.*
- 45387, 45388.** The right and left metacarpus, of small size ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 21674.** The left metacarpus ; from the Pleistocene of Grays.  
*Purchased, 1846.*
- 47612-15.** Several imperfect specimens of the metacarpus ; from the caverns of Gibraltar.  
*Brome Collection. Presented, 1876.*
- 47617, 47618.** Two portions of the innominates ; from the caverns of Gibraltar.  
*Brome Collection. Presented, 1876.*
- 7580.** Part of the left innominate ; from the Pleistocene of Lewes.  
*Mantell Collection. Purchased, 1836.*
- 24963.** The proximal portion of the left femur ; from the Pleistocene of Grays.  
*Presented by D. Sharpe, Esq., 1850.*

- 45361.** The distal epiphysis of the right femur; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 21635.** The distal extremity of the left femur; from the Pleistocene of Grays. *Purchased, 1846.*
- 47619-22.** Several portions of the femur; from the caverns of Gibraltar. *Brome Collection. Presented, 1876.*
- 32742-3.** Two specimens of the femur and tibia, one imperfect proximally; from the Pleistocene of Jarrow, Durham. *Presented by Messrs. Harrison and Hodgson, 1857.*
- 24382.** The left femur, wanting the head; from the Pleistocene of Kew. *Presented by T. Layton, Esq., 1849.*
- 45362.** The right tibia, imperfect proximally; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 20263.** The left tibia; from the Pleistocene of Grays. *Purchased, 1846.*
- 18097.** Two specimens of the left tibia; from the Pleistocene of Ireland. *Purchased, 1842.*
- 47623.** Fragments of the tibia; from the caverns of Gibraltar. (*Fig.*) One specimen is figured by Busk, *op. cit.* pl. xxi. fig. 4. *Brome Collection. Presented, 1876.*
- 47624.** Fragments of the tibia; from the caverns of Gibraltar. *Brome Collection. Presented, 1876.*
- 21632, 23133.** Three specimens of the calcaneum; from the Pleistocene of Grays. *Purchased, 1846.*
- 45368-70.** Three specimens of the calcaneum; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 47627, 47628.** Two specimens of the calcaneum and an astragalus, provisionally referred to this species; from the caverns of Gibraltar. *Brome Collection. Presented, 1876.*
- 47626.** Several astragali; from a cavern at Gibraltar. *Brome Collection. Presented, 1876.*
- 18834, 21298, 22036.** Several specimens of the astragalus; from the Pleistocene of Grays. *Purchased.*
- 45366, 45367.** Two specimens of the left astragalus; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*



- 16840, 18364.** Two large specimens of the astragalus; from Kent's Cavern. 16840, *McEnery Collection. Presented, 1842.*  
18364, *Presented by Rev. U. Richards, 1845.*
- 45371-73.** Three specimens of the metatarsus; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 19843.** The right metatarsus; from the Pleistocene of Grays.  
*Purchased, 1846.*
- 18098.** Two specimens of the metatarsus; from the Pleistocene of Ireland.  
*Purchased, 1842.*
- 47630-32.** Four specimens of the metatarsus (two imperfect); from the caverns of Gibraltar.  
*Brome Collection. Presented, 1876.*
- 23126, 23127.** A small metacarpus and metatarsus, which may perhaps belong to a small form of the present species; from the Pleistocene of Grays. *Purchased, 1849.*
- 45375-78.** Four phalangeals; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 21318 a.** The atlas and axis vertebræ; from the Pleistocene of Grays.  
*Purchased, 1847.*
- 39260, 39261.** The atlas and axis vertebræ; from the Pleistocene of Grays. *Presented by C. Charlesworth, Esq.*
- 47601.** The imperfect axis vertebra; from a cavern in Gibraltar. (*Fig.*) *Figured by Busk, op. cit. pl. xx. fig. 3.*  
*Brome Collection. Presented, 1876.*
- 18824.** The axis vertebra; from the Pleistocene of Grays.  
*Purchased, 1845.*
- 39288.** The associated third, fourth, and fifth cervical vertebræ; from the Pleistocene of Saffron Walden, Essex.  
*Presented by G. E. Roberts, Esq., 1856.*
- 45346, 45347.** The third and sixth cervical vertebræ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45348.** An early dorsal vertebra; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*
- 45383.** The associated last three dorsal and five lumbar vertebræ; from the Pleistocene of Ilford.  
*Brady Collection. Purchased, 1878.*

- 32744 a.** Four associated lumbar vertebræ, together with ribs, and parts of the scapula and pelvis; from the Pleistocene of Jarrow.

*Presented by Messrs. Harrison and Hodgson, 1857.*

- 47603.** The sacrum; from a cavern in Gibraltar.

*Brome Collection. Presented, 1876.*

- 32741.** The sacrum; from the Pleistocene of Jarrow.

*Presented by Messrs. Harrison and Hodgson, 1857.*

#### E. *Rusine Group.*

The antlers are rounded, and often strongly grooved; there is no bez-tyne, and the beam is simply forked, upright, and but little curved, the angle formed by the brow-tyne, which rises close to the burr, being an acute one. The molars are less hypsodont than in the Axine group.

#### *Cervus aristotelis*, Cuvier <sup>1</sup>.

*Hab.* India, Burma, and Siam.

The following specimens indicate a species closely resembling the Sambur, and in the absence of any evidence to the contrary, are provisionally referred to that species.

- 36849, 36850.** Two specimens of the hinder portion of the cranium, with the pedicles of the antlers; from the Pleistocene of the Narbada Valley, India.

*Presented by C. Fraser. Before 1843.*

- M. 2301.** Base of an antler; from the Pleistocene of the Narbada Valley. This specimen cannot be distinguished from the antler of the Sambur.

*Presented by C. Fraser, Esq. Before 1843.*

- M. 2302.** Base of an antler; either from the Pleistocene of the Narbada Valley, or from the Pliocene of the Siwalik Hills. If from the latter, it is perhaps specifically distinct from *C. aristotelis*.

*? Presented by C. Fraser, Esq. Before 1843.*

*The following specimens from the Pleistocene of the Narbada Valley may belong to the present form; they were all presented by C. Fraser, Esq. Before 1843.*

- M. 2303.** The right metacarpus.

<sup>1</sup> Ossements Fossiles, 2nd ed. vol. iv. p. 503 (1823).

**M. 2304.** The distal extremity of the right femur.

**M. 2305.** The proximal portion of the right tibia.

***Cerbus porcinus*, Zimmermann<sup>1</sup>.**

*Hab.* India.

**M. 2306.** The pedicle and base of an antler provisionally referred to this species; from the Pleistocene of the Narbada Valley, India. *Presented by C. Fraser, Esq. Before 1843.*

*The following specimens from the same deposit may belong to the same species as the preceding.*

**39579.** The right metacarpus.

*Presented by C. Fraser, Esq. Before 1843.*

**36741.** The right tibia.

*Presented by C. Fraser, Esq. Before 1843.*

**36742-4.** The associated left calcaneum, astragalus, and naviculo-cuboid.

*Presented by the Secretary of State for India, 1860.*

**F. *Rucervine Group*.**

In this group there is no bez-tyne, and the antlers are more or less flattened, and more curved than in the last group; the beam is much bent, and the brow-tyne is given off at an obtuse angle. The dentition of the existing members is of a more brachyodont character than in the latter.

***Cervus sivalensis*, Lydekker<sup>2</sup>.**

This species was founded solely on molar teeth, which present a considerable resemblance to those of *C. duvaucelli*. The cranium provisionally referred to this species likewise resembles that of *C. duvaucelli*, while the antlers which probably belong to it are apparently intermediate between those of the latter species and *C. eldi*.

*Hab.* India.

<sup>1</sup> Specimen. Zool. Geogr. Quad. p. 532 (1777).

<sup>2</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. xvii (1880).

All the following specimens are from the Pliocene of the Siwalik Hills ; and, unless otherwise stated, belong to the Cautley Collection. Presented, 1842.

- 48440.** Fragment of the left maxilla, containing the second and third true molars. This specimen is described and the last molar figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pp. 121, 122 ; the figure being reproduced in the accompanying woodcut (fig. 10). Presented by C. Falconer, Esq., 1867.

Fig. 10.



*Cervus sivalensis*.—The third left upper true molar ; from the Siwalik Hills.  
†. (From the 'Palæontologia Indica.')

- 39570.** The greater portion of the cranium, broken off a short distance above the orbits. This specimen shows the whole of the cheek-dentition, the true molars of which appear to agree exactly with those of the last. The cranium agrees very closely with that of *C. duvaucelli*, especially in the marked frontal concavity at the orbits, and the forward swell at the pedicles of the antlers ; it differs, however, in the smaller lachrymal vacuities, which resemble those of *C. axis*.
- 41834.** Part of the left frontal, with the pedicle and base of the antler, provisionally referred to this species. The antler shows a brow-tyne arising at some distance above the burr, and forming an obtuse angle with the beam, which is curved backwards. The form of this antler is intermediate between that of *C. duvaucelli* and *C. eldi*.
- 41834 a.** Base of a very similar right antler, in which the brow-tyne rises at a greater distance from the burr.



- 41834 b.** Base of a larger left antler, in which the brow-tyne rises very close to the burr. This specimen shows the great curvature of the beam.
- 41834 c.** Base of a very similar left antler. The beam shows small points on its anterior border, as in *C. eldi*.
- M. 2307.** Base of an antler with numerous small points on the anterior border of the beam, which may belong to the same species as the preceding.
- 41834 d.** Terminal portion of the beam of an antler. The beam is much curved, and terminates in a simple fork, as in *C. eldi*.
- M. 2308.** Terminal portion of the beam of a very similar antler, but with less curvature.
- M. 2309.** Base of an antler belonging to a type allied to the preceding, but with a less open angle between the beam and the brow-tyne.

*Some of the following specimens may belong to the present species.*

- M. 2310.** Hinder portion of the cranium of a female.
- 27680.** The occiput of a small form.
- 17468.** The anterior portion of the palate, showing the premolars and first true molar.
- M. 2311.** The distal extremity of a radius.
- M. 2312.** The proximal two thirds of a left metatarsus.
- M. 2412 a.** An astragalus.
- 39576.** Five associated thoracic vertebræ.
- M. 2313.** Three associated dorsal vertebræ, with the heads of the ribs attached.
- M. 2314.** Three associated lumbar vertebræ.

#### *G. Axine Group.*

Antlers rounded, with no bez-tyne, the beam usually curved, and the brow-tyne generally given off at an acute or a right angle; the usual number of tynes is three or four; the molars are hypsodont in the existing forms.

**Cervus perrieri**, Croizet and Jobert <sup>1</sup>.

Syn. *Cervus issiodorensis*, Pomel <sup>2</sup> (ex Croiz. & Job.).

The antler is round, grooved, and has four tynes; the pedicle is short; the burr stout, and set nearly at right angles to the beam; brow-tyne rising close to the burr; beam nearly straight between brow and second tyne. The species is of large size, and is considered to be allied to *C. taëvanus* of Formosa.

*Hab.* France and (?) England.

- 34589.** Lower part of a right antler provisionally referred to this species; from the Upper Pliocene of Ardé (Puy-de-Dôme), France. This specimen agrees with the one figured by Boyd-Dawkins in the Quart. Journ. Geol. Soc. vol. xxxiv. p. 408, fig. 3 (1878).

*Bravard Collection. Purchased, 1852.*

**Cervus etueriarium**, Croizet and Jobert <sup>3</sup>.

Syn. *Cervus rusoides*, Pomel <sup>4</sup>.

*Cervus stylodus*, Bravard, MS.

*Cervus peyrollensis*, Bravard, MS.

This small form is closely allied to *C. axis*, and Boyd-Dawkins (Quart. Journ. Geol. Soc. vol. xxxiv. p. 410) mentions that it is only provisionally distinguished from *C. pardinensis*; the distinction of the latter from *C. perrieri* being also doubtful. The antlers have a double curve, and three tynes; the burr is at right angles to the pedicle, the latter being short; the brow-tyne is compressed, and joins the beam at an acute angle; the second tyne rounded; fork of crown webbed.

*Hab.* France and Italy.

- 28833, 28834.** Two imperfect antlers; from the Upper Pliocene of the Val d'Arno, Italy. Noticed by Boyd-Dawkins, *op. cit.* p. 410. *Presented by J. B. Pentland, Esq., 1853.*

- 34458.** The pedicle and brow-tyne of an antler; from the Upper Pliocene of Peyrolles, near Issoire (Puy-de-Dôme), France.

*Bravard Collection. Purchased, 1852.*

<sup>1</sup> OSS. FOSS. d. Puy-de-Dôme, *Cervidæ*, pl. iv. (1828).

<sup>2</sup> Catalogue Méthodique, p. 105 (1853).

<sup>3</sup> OSS. FOSS. d. Puy-de-Dôme, *Cervidæ*, pl. vi. (1828).

<sup>4</sup> Catalogue Méthodique, p. 106 (1853).

- 34518.** Base of an antler, with the brow-tyne; from the Upper Pliocene of Peyrolles.

*Bravard Collection. Purchased, 1852.*

- 34523-29.** Numerous imperfect antlers; from the Upper Pliocene of Peyrolles. Noticed by Boyd-Dawkins, *loc. cit.*

*Bravard Collection. Purchased, 1852.*

*The following specimens from the Upper Pliocene of Peyrolles are provisionally referred to the present species. They belong to the Bravard Collection (Purchased, 1852), and indicate a much smaller form than bones from the same locality provisionally referred to C. tetraceros.*

- 34459-61.** Five specimens of the maxilla (some imperfect) with the cheek-teeth.

- 34484-88 and 34570-77.** Numerous imperfect specimens of mandibular rami and detached lower molars.

- 34549.** The glenoidal extremity of the left scapula.

- 34550-52, 34580.** Four specimens of the humerus, imperfect proximally.

- 34557-59.** Three specimens of the radius, two of which are imperfect.

- 34561, 34562.** Two imperfect specimens of the metacarpus.

- 34570.** A first phalangeal.

- 34581-2, 34584, 34563-64.** Five specimens of the tibia, three of which are imperfect.

- 34565-6.** Two specimens of the astragalus.

- 34567.** The left calcaneum.

- 34568-9.** Two imperfect specimens of the metatarsus.

- 34533-5.** Three imperfect cervical vertebræ.

*Some of the following specimens, from the Upper Pliocene of the Val d'Arno, may perhaps belong to the present species; they were all presented by J. B. Pentland, Esq., 1853.*

- 28839.** A left metacarpus of very small size.

**28827.** The left tarsus and the proximal extremity of the metatarsus.

**28828.** The proximal extremity of the left tibia, with the associated astragalus and naviculo-cuboid, of rather smaller size than the preceding.

***Cervus suttonensis*, Boyd-Dawkins<sup>1</sup>.**

The base of the antler is cylindrical, and the burr very strongly marked, and situated obliquely to the axis of the beam, which is deeply grooved. The beam is straight and cylindrical, except at the origin of the brow-tyne, which rises immediately above the burr. The only other tynes are those formed by the forking of the beam at its extremity. The species is considered closely allied to *C. pardinensis*, of which its founder says it may be merely a variety.

*Hab.* England and France.

**27515.** The basal half of a large antler; from the Red Crag of (Fig.) Sutton, Suffolk. This specimen (which, with the other antlers figured by the same writer, is the type) is figured by Boyd-Dawkins in the Quart. Journ. Geol. Soc. vol. xxxiv. p. 412, fig. 8. *Purchased*, 1852.

**27858.** Basal portion of a smaller antler; from the Red Crag of (Fig.) Felixstowe, Suffolk. Figured by Boyd-Dawkins, *op. cit.* fig. 7. *Presented by John Brown, Esq.* 1852.

**27516.** The basal two thirds of a younger antler; from the Red (Fig.) Crag of Sutton. Figured by Boyd-Dawkins, *op. cit.* fig. 9. *Purchased*, 1852.

**M. 2320.** Basal portion of an antler; from the Red Crag near (Fig.) Ipswich, Suffolk. Figured by Owen in the Quart. Journ. Geol. Soc. vol. xii. p. 234, fig. 16, under the name of *C. dicroceros*. *Presented by G. Ransome, Esq.*

**39505.** Base of an antler; from the Red Crag of Felixstowe. *Brown Collection. Presented by Sir R. Owen, K.C.B.,* 1859.

**28982.** Basal half of an antler; from the Red Crag of Woodbridge, Suffolk. *Purchased*, 1854.

**43176-7.** Two specimens of the base of the antler; from the Red Crag of Sutton. *Wetherell Collection, Purchased*, 1871.

<sup>1</sup> Quart. Journ. Geol. Soc. vol. xxxiv. p. 411 (1878).



**M. 1979.** Basal portion of an antler; from the Red Crag of Suffolk.  
*Presented by Sir R. Owen, K.C.B., 1884.*

**M. 1899.** Basal portion of an antler; from the Red Crag of Suffolk.  
*No history.*

**50013.** Part of the beam of an antler at its bifurcation; from the Red Crag of Suffolk.  
*Bequeathed by Sir Walter C. Trevelyan, Bart., 1879.*

*The specific reference of the following specimens is provisional:—*

**37434.** Pedicle and base of an antler; from the Red Crag of Suffolk.  
*Purchased, 1852.*

**44034.** Pedicle and base of a smaller antler; from the Red Crag of Woodbridge.  
*Purchased, 1873.*

**27860.** Base of an antler; from the Red Crag of Felixstowe.  
*Purchased, 1852.*

**39506.** Base of an antler; from the Red Crag of Tallingstone.  
*Brown Collection. Presented by Sir R. Owen, K.C.B., 1859.*

*It is possible that some of the following specimens from the Red Crag belong either to this species or to C. falconeri: the true molars are of a hypsodont structure:—*

**28248, 44631, 46707–10.** Six upper true molars of a small species; from Woodbridge.  
*Purchased.*

**46705–6.** Two slightly larger upper true molars; from Woodbridge.  
*Purchased, 1875.*

**46708.** A still larger upper true molar; from Woodbridge.  
*Purchased, 1875.*

**46704.** A still larger upper true molar; from Woodbridge.  
*Purchased, 1875.*

**28992.** A first or second lower true molar, of small size; from Suffolk.  
*Purchased, 1853.*

**49458.** A third right lower true molar, agreeing in size with the last; from Suffolk.  
*Purchased, 1875.*

- 35859.** A third left lower true molar, very similar to the preceding ; from Suffolk. *Presented by J. Berners, Esq., 1861.*
- 46699.** A third right lower true molar, of rather larger size ; from Woodbridge. *Purchased, 1875.*
- 28991.** A first or second lower true molar, of considerably larger size ; from Woodbridge. *Purchased, 1853.*
- 28979, 41245-6, 43517, 45990.** Six specimens of small-sized astragali ; from various localities in Suffolk. *Purchased.*
- 28993, 43516.** Two larger astragali ; from Woodbridge. *Purchased.*
- 43178.** A right naviculo-cuboid, agreeing in size with the smaller astragali ; from Suffolk. *Wetherell Collection. Purchased, 1871.*

***Cervus cylindroceros*, Boyd-Dawkins<sup>1</sup> (*ex* Bravard MS.).**

Syn. (♀) *Cervus ambiguus*, Pomel<sup>2</sup>.

*Cervus gracilis*, Bravard, MS. (*in parte*).

The antlers of this species present a strong resemblance to those of the preceding, but are distinguished by the brow-tyne arising at a considerable distance above the burr.

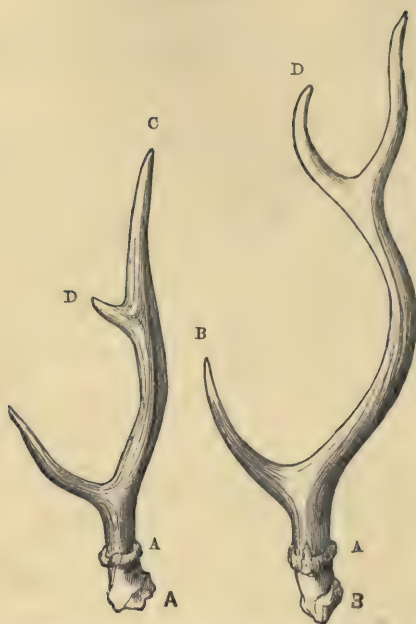
*Hab.* France.

- 34590.** An adult right antler ; from the Upper Pliocene of Ardé (*Fig.*) (Puy-de-Dôme), France. This specimen (which with the next is the type of the species) is figured by Boyd-Dawkins in the Quart. Journ. Geol. Soc. vol. xxxiv. p. 415, fig. 11 ; the figure being reproduced in the accompanying woodcut, fig. 11. *Bravard Collection. Purchased, 1852.*
- 34607.** A younger right antler ; from the Upper Pliocene of Ardé. (*Fig.*) Figured by Boyd-Dawkins, *op. cit.* fig. 12 ; and in the accompanying woodcut (fig. 11). This specimen is the type of Bravard's *C. gracilis*. *Bravard Collection. Purchased, 1852.*
- 34588-9.** Two specimens of the pedicle and base of the antler ; from the Upper Pliocene of Ardé. *Bravard Collection. Purchased, 1852.*

<sup>1</sup> Quart. Journ. Geol. Soc. vol. xxxiv. p. 414 (1878).

<sup>2</sup> Catalogue Méthodique, p. 107 (1853).

Fig. 11.



*Cervus cylindroceros*.—Antlers: A, No. 34097; B, 34590; from the Upper Pliocene of Ardé. (From the 'Geological Society's Journal.')

*The following specimens from the Upper Pliocene of Ardé may be provisionally referred either to the present species or to C. perrieri; they indicate a comparatively large form, and all belong to the Bravard Collection (Purchased, 1852), unless otherwise stated.*

**34591.** Fragment of the right maxilla, with mm. 4, m. 1, and m. 2.

**34592-4.** Three portions of mandibular rami, one showing mm. 4.

**34595.** The glenoidal half of the right scapula.

**34596-7.** Two specimens of the distal portion of the humerus.

**27618 a.** The distal portion of the right humerus, rather larger than the preceding specimens.

*Croizet Collection. Purchased, 1848.*

**34599-600.** Three specimens of the radius, two of which are imperfect.

**34586, 34602-3.** Three specimens of the metacarpus, one imperfect.

34604. The right astragalus.

34605. Two specimens of the right calcaneum.

34587. The right metatarsus. This and No. 34586 perhaps belong to *C. perrieri*.

*The following specimens from the same locality, which were referred by Bravard to his C. gracilis, indicate a much smaller, and apparently distinct, form.*

34608. The left ramus of the mandible, with the six cheek-teeth.

34609. The left radius.

#### H. Tetracerotine Group.

##### **Cervus tetraceros**, Boyd-Dawkins<sup>1</sup> (*ex* Bravard, MS.).

The only living Deer having antlers approaching the form of those of this species is *Cariacus virginianus*; but the resemblance is not sufficiently close to indicate that the fossil belongs to the same genus. The antlers are laterally compressed; and in the adult the beam gives off four long, curved tynes.

*Hab.* France and (?) England.

34405. An antler of the fourth year; from the Upper Pliocene of (Fig.) Peyrolles (Puy-de-Dôme), France. This and the two other figured specimens are the types of the species; the present specimen is figured by Boyd-Dawkins in the Quart. Journ. Geol. Soc. vol. xxxiv. p. 417, fig. 15 (1878).

*Bravard Collection. Purchased, 1852.*

34406. An antler of the fifth year; from the Upper Pliocene of (Fig.) Peyrolles. Figured by Boyd-Dawkins, *loc. cit.* fig. 16; and reproduced in the accompanying woodcut (fig. 12).

*Bravard Collection. Purchased, 1852.*

34407, 34407 a. Two specimens of antlers of the fifth year; from the Upper Pliocene of Peyrolles.

*Bravard Collection. Purchased, 1852.*

34408, 34408 a. Two specimens of antlers of the sixth year; from the Upper Pliocene of Peyrolles.

*Bravard Collection. Purchased, 1852.*

<sup>1</sup> Quart. Journ. Geol. Soc. vol. xxxiv. p. 416 (1878).



**34409.** An antler of the sixth year ; from the Upper Pliocene of (Fig.) Peyrolles. Figured by Boyd-Dawkins, *loc. cit.* fig. 17, and reproduced in the accompanying woodcut (fig. 12).

*Bravard Collection. Purchased, 1852.*

Fig. 12.



*Cervus tetraceros.*—Antlers of the fifth (No. 34406) and sixth (No. 34409) years ; from the Upper Pliocene of Peyrolles. (From the Geological Society's Journal.)

**33506.** Terminal portion of an antler perhaps belonging to the present species ; from the Norwich Crag of Norfolk.

*Purchased, 1858.*

*The following specimens from the Upper Pliocene of Peyrolles are provisionally referred to the present species ; they all belong to the Bravard Collection (Purchased, 1852); and indicate a large-sized animal.*

**34410-16.** Numerous specimens of upper molars.

- 34424-7. Four portions of mandibular rami.  
 34436. Part of the left scapula.  
 34437-8. Two specimens of the distal extremity of the left humerus.  
 34443. The left tibia, imperfect proximally.  
 34445. The proximal extremity of the right tibia.  
 34452-3. Two specimens of the right calcaneum.  
 34448-51. Four specimens of the astragalus.  
 34443 a. The left metatarsus, imperfect proximally.

I. *Of uncertain position.*

**Cervus polignacus**, F. Robert<sup>1</sup>.

Syn. (P) *Cervus arvernensis*, Croizet and Jobert<sup>2</sup>.

*Cervus roberti*, Pomel<sup>3</sup>.

The reference of the following specimens is provisional; they show a brow and bez tyne (the latter much curved), and the extremity of the antler is flattened and palmated. The species was considered by its describer as allied to *C. dama*.

*Hab.* Europe.

M. 2321. The left frontal, and the beam of the antler; (?) from the Forest-bed of Norfolk. *No history.*

33471 i. The frontals, with the base of the right antler; dredged off the Norfolk coast.

*Layton Collection. Purchased, 1858.*

33471 j. Three fragments of antlers; from the Forest-bed of Norfolk.

*Layton Collection. Purchased, 1858.*

48937. The base of a young antler; from the Forest-bed of Norfolk.

*Purchased, 1878.*

**Cervus curtoceros**, Kaup<sup>4</sup>.

The antlers of this form have a much-curved beam, with a bez and brow tyne; its right to distinction is perhaps doubtful.

*Hab.* Europe.

<sup>1</sup> Ann. Soc. Agric. Sci. le Puy, 1829, pl. iii. fig. 1, *teste* P. Gervais. Gervais identifies this species with *C. somonensis*, Desmarest; but the writer is informed that the latter is founded on an antler incorrectly restored.

<sup>2</sup> Oss. Foss. d. Puy-de-Dôme, *Cervidæ*, pl. xii. (1828).

<sup>3</sup> Catalogue Méthodique, p. 103 (1853).

<sup>4</sup> Archiv für Mineralogie, vol. vi. p. 222 (1833).

- M. 2316.** Cast of part of the right frontal, with the base of the antler; the original, which is the type, is from the Pleistocene of Eppelsheim, Hesse Darmstadt, and is preserved in the Darmstadt Museum; it is figured by Kaup in the 'Archiv für Mineralogie,' vol. vi. pl. iv. figs. 1, 2, and in the Oss. Foss. d. Darmstadt, pl. xxiv. fig. 1. *No history.*

*The following specimens from the Upper Pliocene of the Val d'Arno are not specifically determined; they indicate a species almost the size of C. tetraceros, and were presented by J. B. Pentland, Esq., 1853.*

- 28836.** The proximal two thirds of the left metacarpus.

- 28826.** The distal half of the right tibia, with the associated astragalus and naviculo-cuboid.

- 28829.** The left naviculo-cuboid.

*The following English specimens are not specifically determined.*

- 33508, 33511.** Two portions of antlers; from the Norwich Crag.

*Wigham Collection. Purchased, 1858.*

- 45844.** Fragment of an antler; from the Red Crag.

*Purchased, 1874.*

- 49445.** Base of an antler; dredged off the Eastern coast.

*Purchased, 1878.*

- 48936.** Fragment of an antler; from the Norwich Crag, near Norwich.

*Wigham Collection. Purchased, 1858.*

- 46947.** Base of an antler; from the Forest-bed of Norfolk.

*Purchased, 1876.*

### **Cervus (?) lunatus, H. v. Meyer<sup>1</sup>.**

This species was considered by its founder as generically distinct from *Palæomeryx*; but its geological horizon indicates that it probably belongs to that or an allied genus.

*Hab.* Switzerland.

- 36997.** Fragment of a maxilla with one premolar, and of the left ramus of a mandible with two molars, said to belong to this species: from the Middle Miocene of Käpfnach (Zurich), Switzerland.

*Purchased, 1861.*

<sup>1</sup> Neues Jahrb. 1838, p. 413.

*The generic position of the following form is not determined.*

*Hab.* S. America.

- 37676.** The greater part of a shed antler; from the Pleistocene of Buenos Ayres. This specimen is of extremely small size, greatly palmated at the base, and giving off four tynes, of which one is broken. It is unlike any existing form.

*Bravard Collection. Purchased, 1854.*

Genus **CERVULUS**, Blainville<sup>1</sup>.

Syn. *Styloceros*, Hamilton Smith<sup>2</sup>.

*Prox*, Ogilby<sup>3</sup>.

In this genus the antlers are simply forked, the division rising immediately or at some distance above the burr, which is placed on a long pedicle; the dentition is hypsodont. The antlered form of the brachyodont genus *Palæomeryx* (*P. furcatus*) possesses antlers of a similar type; and it is probable that there is a complete transition between the two genera. The reference of the two species noticed below to the present genus is provisional.

**Cervulus (?) dicranoceros** (Kaup<sup>4</sup>).

Syn. *Cervus dicranoceros*, Kaup<sup>5</sup>.

*Cervus anoceros*, Kaup<sup>6</sup>.

*Cervus trigonoceros*, Kaup<sup>7</sup>.

The writer follows Boyd-Dawkins (Quart. Journ. Geol. Soc. vol. xxxvi. p. 403) in uniting the above-mentioned three forms. Rüttimeyer, in the 'Natürliche Geschichte der Hirsche' (Abh. schweiz. pal. Ges. 1883), part 2, p. 102, observes that they may belong to *Palæomeryx*; but the evidence of the dentition is required before the point can be determined. The species is distinguished from *P. furcatus* by the longer interval between the burr and the forking of the antler.

*Hab.* Germany.

- M. 2318.** Cast of the lower part of an antler. The original, which is the type, is from the Upper Miocene of Eppelsheim, Hesse Darmstadt, and is figured by Kaup in the 'Archiv für Mineralogie,' vol. vi. pl. iv. fig. 9, and in the 'Oss. Foss. d. Darmstadt,' pl. xxiv. fig. 3 c. *No history.*

<sup>1</sup> Bull. Soc. Philom. Paris, 1816, p. 74.

<sup>2</sup> In Griffith's 'Animal Kingdom,' vol. v. p. 319 (1827).

<sup>3</sup> Proc. Zool. Soc. 1836, p. 135.

<sup>4</sup> Archiv für Mineralogie, vol. vi. p. 219 (1833), *Cervus*.

<sup>5</sup> *Loc. cit.*

<sup>6</sup> *Ibid.* p. 217.

<sup>7</sup> *Ibid.* p. 221.



- M. 2317.** Cast of the base of an antler; the original is from the Upper Miocene of Eppelsheim, and is figured by Kaup in the 'Archiv für Mineralogie,' *loc. cit.* figs. 6, 7, and in the 'Oss. Foss. d. Darmstadt,' *loc. cit.* fig. 3 a. *No history.*
- 19450.** Base of an antler; from the Upper Miocene of Eppelsheim.  
*Purchased from Dr. Kaup, 1845.*
- 21484.** Base of an antler; from the Upper Miocene of Eppelsheim.  
*Purchased from Dr. Kaup, 1847.*
- 21484 a.** A very young antler, without bifurcation; from the Upper Miocene of Eppelsheim. *Purchased from Dr. Kaup, 1847.*
- M. 2319.** Cast of the pedicle and base of an antler. The original is from the Upper Miocene of Eppelsheim, and is figured by Kaup in the 'Archiv für Mineralogie,' *loc. cit.* figs. 4, 5, and in the Oss. Foss. d. Darmstadt, *loc. cit.* fig. 2, under the name of *C. anoceros*, of which it is the type.  
*No history.*
- M. 1617.** Two specimens of the basal portions of antlers and one detached tyne, provisionally referred to the present species; from the Red Crag of Felixstowe, Suffolk. These specimens differ from the antlers of *Cervus suttonensis* in the long interval between the burr and the bifurcation.  
*Presented by C. Westendarp, Esq., 1884.*

***Cervulus* (?) *australis* (M. d. Serres<sup>1</sup>).**

Syn. *Cervus australis*, M. d. Serres<sup>2</sup>.

Boyd-Dawkins (Quart. Journ. Geol. Soc. vol. xxxiv. p. 404) regards this form as closely allied to the preceding, with which it may perhaps be identical.

*Hab.* France.

- 21906.** Base of an antler; from the Lower Pliocene of Puy-en-Velay (Haute Loire), France.  
*Croizet Collection. Purchased, 1848.*

*The following specimen appears to indicate a form allied to the present species.*

- 21862 x.** Basal part of an antler; from the Middle Miocene of Sansan (Gers), France.  
*Croizet Collection. Purchased, 1848.*

<sup>1</sup> Rech. s. les Oss. d. Cavernes d. Lunel-Viel, p. 230 (1832), *Cervus*.

<sup>2</sup> *Loc. cit.*

Genus **PALÆOMERYX**, H. v. Meyer<sup>1</sup>.Syn. *Dremotherium*, E. Geoffroy<sup>2</sup>.*Dicroceros*, Lartet<sup>3</sup>.*Micromeryx*, Lartet<sup>4</sup>.*Propalæomeryx*, Lydekker<sup>5</sup>.

The name *Dremotherium* has the priority over *Palæomeryx*, but as the latter was more fully defined at the time of publication it has been adopted: German writers adopt the latter, and French the former. Riitimeyer remarks<sup>6</sup> that the dentition of *Amphitragulus* is almost indistinguishable from that of *Palæomeryx*; and the present writer would have been fain to unite the two, were it not that the same writer indicates certain cranial differences which he regards as of importance. Certain specimens in the Museum, which have been received with labels affixed to them bearing the name *Palæomeryx*, cannot apparently be distinguished from *Amphitragulus*. The molars of this and the next genus are less specialized than those of the existing *Cervidæ*; but the two genera probably pass gradually in one direction through the species unprovided with antlers into *Gelocus* and its allies, and in the other direction through the antlered forms into the more generalized species of antlered Deer like *Cervulus* (?) *diceranoceros*, which is probably scarcely distinguishable from *Palæomeryx*. When antlers are present they are pedicled, and of the simple type of the existing *Cervulus*.

Dentition:—I.  $\frac{0}{3}$ , C.  $\frac{0(?) - 1}{1}$ , Pm.  $\frac{3}{3}$ , M.  $\frac{3}{3}$ .

**Palæomeryx sivalensis**, Lydekker<sup>7</sup>.Syn. *Propalæomeryx sivalensis*, Lydekker<sup>8</sup>.

This is a large species, which, in the sense in which *Palæomeryx* is here employed, may probably be referred to that genus.

*Hab.* India.**M. 1974.** Cast of a left upper true molar, in a well-worn condition.

The original, which is the type, is from the Pliocene Siwaliks near Rurki, N.W. India; and is preserved in the

<sup>1</sup> Die fossile Knochen und Zähne von Georgensgmünd, p. 92 (1834).<sup>2</sup> Revue Encyclopédique, vol. lix. p. 82 (1833), teste Flower.<sup>3</sup> Notice sur la Colline de Sansan, p. 34 (1851).<sup>4</sup> Notice sur la Colline de Sansan, p. 36 (1851).<sup>5</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. ii. p. 173 (1883),<sup>6</sup> Natürliche Geschichte der Hirsche (Abh. schweiz. pal. Ges., 1883), pt. 2,

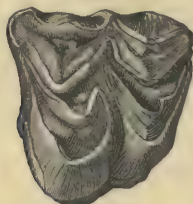
pp. 92-96.

<sup>7</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. ii. p. 173 (1883),*Propalæomeryx*.<sup>8</sup> *Loc. cit.*

Indian Museum, Calcutta (No. B. 337). It is described and figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. pp. 173, 174; the figure being reproduced in the accompanying woodcut (fig. 13).

Presented by R. Lydekker, Esq., 1884.

Fig. 13.



*Palæomeryx sivalensis*.—Left upper true molar; from the Siwaliks.  $\frac{1}{2}$ .  
(From the 'Palæontologia Indica.')

### **Palæomeryx bojani**, H. v. Meyer<sup>1</sup>.

Syn. *Dicroceros* (P) *magnus*, Lartet<sup>2</sup>.

This is the second largest European species; the length of  $\overline{m.3}$  being usually 0,030. There appear to have been no antlers.

*Hab.* Europe.

**21868.** The dental portion of the right ramus of the mandible, containing the last five cheek-teeth; from the Middle Miocene of Sansan (Gers), France. The length of  $\overline{m.3}$  is 0,032. *Croizet Collection. Purchased, 1848.*

**21869.** The second right lower true molar; from the Middle Miocene of Sansan. *Croizet Collection. Purchased, 1848.*

**21869 a.** Cast of an upper (broken) and lower true molar. The originals are probably from the Middle Miocene of Sansan. *Purchased.*

### **Palæomeryx furcatus** (Hensel<sup>3</sup>).

Syn. *Prox furcatus*, Hensel<sup>4</sup>.

*Dicroceros elegans*, Lartet<sup>5</sup>.

*Palæomeryx scheuchzeri*, H. v. Meyer<sup>6</sup> (*in parte*).

Fraas and Rüttimeyer identify *Palæomeryx scheuchzeri*, Meyer, with Hensel's *Prox furcatus*, and the latter writer<sup>7</sup> inclines to the

<sup>1</sup> Die fossile Zähne und Knochen von Georgensgmünd, p. 92 (1834).

<sup>2</sup> Notice sur la Colline de Sansan, p. 35 (1851).

<sup>3</sup> Zeitschr. deutsch. geol. Ges. vol. xi. p. 278 (1859), *Prox.* <sup>4</sup> *Loc. cit.*

<sup>5</sup> Notice sur la Colline de Sansan, p. 34 (1851).

<sup>6</sup> Neues Jahrb. 1838, p. 413.

<sup>7</sup> Natürliche Geschichte der Hirsche (Abh. schweiz. pal. Ges.), pt. 2, pp. 90–91

opinion that both these forms cannot be distinguished from Lartet's *Dicroceros elegans*—an opinion fully confirmed by the specimens in the Museum. Both writers adopt the specific name *furcatus* for the species, as *P. scheuchzeri* was never properly defined; the specific name *elegans* is liable to lead to confusion with *Amphitragulus elegans*. The length of  $\overline{m. 3}$  varies from 0,018 to 0,023. The males of the typical form from Sansan and Steinheim were provided with antlers of the simple type of those of the living Indian Muntjac. The cranium of the so-called *P. scheuchzeri* appears to be unknown.

*Hab.* Europe.

21864. Portion of the palate, in a much crushed condition; from the Middle Miocene of Sansan (Gers), France. This specimen shows the six cheek-teeth of the left side, and  $\overline{m. 1}$  and  $\overline{m. 2}$  on the right. The teeth agree precisely in form with those figured by Fraas in the 'Fauna von Steinheim,' pl. viii. fig. 9.

*Croizet Collection. Purchased, 1848.*

33580. The right and left maxillæ of two individuals, with the three true molars; from the Middle Miocene of Sansan.

*Purchased, 1858.*

21865. Fragment of the right maxilla, containing the last four cheek-teeth; from the Middle Miocene of Sansan.

*Croizet Collection. Purchased, 1848.*

- M. 2164. Part of the right maxilla, containing the six cheek-teeth in a well-worn condition; from the Middle Miocene of Sansan.

*Purchased, 1885.*

- M. 2165. Part of the right maxilla of an immature individual, showing three milk-molars and the three true molars; from the Middle Miocene of Sansan.

*Purchased, 1885.*

- 40746-7. Two left upper true molars; from the Middle Miocene of Sansan.

*Presented by C. Falconer, Esq., 1867.*

42719. Two left upper true molars; from the Middle Miocene of Sansan.

*Presented by the Trustees of the Christie Museum, 1871.*

- M. 2166. The hinder part of the right ramus of the mandible, showing the three true molars; from the Middle Miocene of Sansan.

*Purchased, 1885.*



- M. 2167.** Fragment of the right ramus of the mandible, containing  $\overline{m. 2}$  and  $\overline{m. 3}$ ; from the Middle Miocene of Sansan.  
*Purchased, 1885.*
- M. 2168.** Fragment of the right ramus of the mandible, with  $\overline{pm. 3}$ ,  $\overline{pm. 4}$ , and  $\overline{m. 1}$ ; from the Middle Miocene of Sansan.  
*Purchased, 1885.*
- 21863.** Part of the right ramus of the mandible, containing the six cheek-teeth; from the Middle Miocene of Sansan. The length of  $\overline{m. 3}$  is 0,020. The lower teeth figured by Fraas in the 'Fauna von Steinheim,' pl. ix. fig. 8, are rather smaller. *Croizet Collection. Purchased, 1848.*
- 33583.** Part of the left ramus of the mandible, containing the last four cheek-teeth; from the Middle Miocene of Sansan.  
*Purchased, 1858.*
- 33583 a.** Part of the right ramus of the mandible, containing the three premolars,  $\overline{m. 1}$  and  $\overline{m. 2}$ , in a much worn condition; from the Middle Miocene of Sansan. *Purchased, 1854.*
- 21868.** The greater part of the right ramus of the mandible, containing the whole of the cheek-dentition; from the Middle Miocene of Sansan.  
*Croizet Collection. Purchased, 1848.*
- 21854.** Part of the right ramus of the mandible, containing the three true molars, in a half-worn condition; from the Middle Miocene of Sansan.  
*Croizet Collection. Purchased, 1848.*
- 21866.** Part of the right ramus of the mandible, containing  $\overline{m. 2}$  and  $\overline{m. 3}$ ; from the Middle Miocene of Sansan.  
*Croizet Collection. Purchased, 1848.*
- 42719.** Two fragments of the mandible; from the Middle Miocene of Sansan.  
*Presented by the Trustees of the Christie Museum, 1871.*
- 37358.** Cast of a portion of the left frontal and the antler. The original is from the Middle Miocene of Steinheim, Bavaria. The specimen is very similar to one figured by Fraas in the 'Fauna von Steinheim,' pl. viii. fig. 6.  
*Purchased, 1863.*

- 3584-5. Two tynes of the antlers; from the Middle Miocene of Sansan. *Purchased, 1858.*
- 40752-3. Two specimens of a fragment of the frontal, with the pedicle and the base of the antler; from the Middle Miocene of Sansan. One specimen (No. 40753) is much larger than the other.  
*Presented by C. Falconer, Esq., 1867.*
- 42719 a. The extremity of an antler; from the Middle Miocene of Sansan.  
*Presented by the Trustees of the Christie Museum, 1871.*
21861. The greater portion of the antler and the pedicle; from the Middle Miocene of Sansan.  
*Croizet Collection. Purchased, 1848.*
21862. Three broken antlers; from the Middle Miocene of Sansan.  
*Croizet Collection. Purchased, 1848.*

*The following specimens from Sansan are provisionally referred to this species.*

21858. Three astragali. *Croizet Collection. Purchased, 1848.*
21871. The naviculo-cuboid. *Croizet Collection. Purchased, 1848.*
40750. The naviculo-cuboid. *Presented by C. Falconer, Esq., 1867.*

*The reference of the following specimen is also provisional.*

33996. Part of the right maxilla; from the Lower Miocene of Allier, France. This specimen agrees very closely in size with the maxilla of *P. furcatus* figured by Fraas in the 'Fauna von Steinheim,' pl. viii. fig. 9; and its teeth, although slightly smaller, cannot be distinguished in form from those of the Sansan specimen, No. 21864. The true molars agree very closely with those of *P. feignouxi* from Allier; but pm. 3 in that species is a narrow tooth, its greatest width in the specimen No. 26849 being 0,008, while it is 0,010 in the present specimen. The length of the space occupied by the three true molars is 0,036.

*P. furcatus* has not hitherto been recorded from the Lower Miocene of France; but the so-called *P. scheuchzeri* occurs in the Lower Miocene of Weissenau, near Mayence.

*Bravard Collection. Purchased, 1852.*

**Palæomeryx feignouxi**, Geoffroy<sup>1</sup>.

Syn. *Dremotherium feignouxi*, Geoffroy<sup>2</sup>.

*Dremotherium traguloides*, Pomel<sup>3</sup>.

*Dremotherium nanum*, Geoffroy<sup>4</sup>.

This species is of medium size, and apparently unprovided with antlers. Rütimeyer remarks that its dentition cannot be distinguished from that of the antlered forms. The lower diastema is of unusual length; the penultimate upper premolar is very narrow; the males were furnished with large upper canines; and the length of  $\overline{m. 3}$  varies from 0,015 to 0,018.

*Hab.* France.

26849. The dental portion of the left maxilla, showing the six cheek-teeth; from the Lower Miocene of Allier, France. This specimen agrees precisely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. xi. fig. 2; and exhibits well the elongated form of  $\overline{pm. 3}$ , by which character the species is distinguished from *Amphitragulus elegans* and *Prodremotherium elongatum*. The length of the space occupied by the three true molars is 0,032, and that by the six cheek-teeth 0,063.

*Pomel Collection.* Purchased, 1851.

33997. Fragment of the left maxilla, containing  $\overline{pm. 2}$ ,  $\overline{pm. 4}$ , and  $\overline{m. 1}$ ; from the Lower Miocene of Allier.

*Bravard Collection.* Purchased, 1852.

33995. Fragment of the right maxilla containing the three true molars (the last broken); from the Lower Miocene of Allier.

*Bravard Collection.* Purchased, 1852.

26874. Part of the right maxilla with the three true molars, partly broken; from the Lower Miocene of Allier.

*Pomel Collection.* Purchased, 1851.

33993. Fragment of the left maxilla, containing the three milk-molars and the first and second true molars; from the Lower Miocene of Allier.

*Bravard Collection.* Purchased, 1852.

26848. The greater portion of the right ramus of the mandible, showing the alveoli of the cutting-teeth, and the six cheek-teeth in a much-worn condition; from the Lower

<sup>1</sup> *Revue Encyclopédique*, vol. lix. p. 82 (1833), *Dremotherium*, teste Flower.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> *Catalogue Méthodique*, p. 99 (1853).

<sup>4</sup> *Études Progressives d'un Naturaliste* (1835).

Miocene of Allier. This specimen agrees precisely with the complete mandible figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. xii. fig. 5. The length of the diastema is 0,040, and that of the space occupied by the six cheek-teeth 0,070. *Pomel Collection. Purchased, 1851.*

34004. Part of the right ramus of the mandible, showing the last four cheek-teeth; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

**Palæomeryx flourensianus** (Lartet<sup>1</sup>).

Syn. *Micromeryx flourensianus*, Lartet<sup>2</sup>.

This is the smallest species of the genus, being about the size of the larger existing species of *Tragulus*. The teeth are rather more hypsodont than those of the preceding species; the length of the space occupied by the three upper true molars is 0,022, the length of m. 3 being 0,008–9. There are four lower premolars. Rüttimeyer records the species from Sansan, Steinheim, and Würtemberg. The molars are readily distinguished from those of *Tragulus* by their brachydont structure.

*Hab.* Europe.

- 30497 a. Numerous detached cheek-teeth; from the Lower Miocene of Weissenau near Mayence, Hesse Darmstadt. These specimens agree precisely with those figured by Fraas in the 'Fauna von Steinheim,' pl. viii. figs. 18, 19.

*Hastings Collection. Purchased, 1855.*

Genus **AMPHITRAGULUS**, Pomel<sup>3</sup>.

Syn. *Tragulotherium*, Croizet, MS.

*Elaphotherium*, Croizet, MS.

The close resemblance of the dentition of this genus to that of *Palæomeryx* has been alluded to under the head of that genus. All the species are unprovided with antlers; and the dental formula is the same as in *Palæomeryx*, with the exception that there are four lower premolars.

**Amphitragulus elegans**, Pomel<sup>4</sup>.

This species is smaller than *Palæomeryx furcatus*, the length of m. 3 being 0,015 to 0,016; the diastema in the mandible is comparatively short, the penultimate upper premolar relatively wide,

<sup>1</sup> Notice sur la Colline de Sansan, p. 36 (1851), *Micromeryx*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Catalogue Méthodique, p. 100 (1853).

<sup>4</sup> Catalogue Méthodique, p. 101 (1853).



while pm. 1 has but a single root. Casts of fragments of mandibles from Switzerland in the Museum labelled *Palaeomeryx scheuchzeri* agree precisely with the French specimens, and have accordingly been referred to the present species. The upper true molars are almost indistinguishable from those of *A. lemanensis*.

*Hab.* Europe.

**M. 2170.** The right half of the palate, with the six cheek-teeth; from the Lower Miocene of St. Gérard-le-Puy (Allier), France. The length of the space occupied by the six teeth is 0,0563; the length of the corresponding space in the specimen described and figured by Filhol, in the Ann. Sci. Géol. vol. xi. art. 1, p. 57, pl. xvi. fig. 4, being 0,054.  
*Purchased, 1885.*

**21928.** Part of the right maxilla containing the last five cheek-teeth, in a well-worn condition; from the Lower Miocene of Allier. This specimen agrees precisely with the one figured by Filhol in the Ann. Sci. Géol. vol. xi. pl. xvi. fig. 4; the length of the three true molars being 0,0295, as against 0,029 in Filhol's specimen. The large development of the inner tubercle of pm. 3 distinguishes the specimen from *A. lemanensis*.

*Croizet Collection. Purchased, 1848.*

**34196.** Fragment of the right maxilla, containing the three true molars in an unworn condition; from the Lower Miocene of Allier. The teeth agree precisely with those of the last specimen. *Bravard Collection. Purchased, 1852.*

**34196 a.** Fragment of the left maxilla, containing the three true molars, in an unworn condition; from the Lower Miocene of Allier. The teeth are slightly smaller than in the last specimen. *Bravard Collection. Purchased, 1852.*

**27598.** Fragment of a right maxilla provisionally referred to this species, showing three milk-molars and m. 1; from the Lower Miocene of Ronzon, near Puy-en-Velay (Haute Loire), France. The first molar is larger than in *Gelocus communis*, and agrees with the corresponding tooth of the present species; there is no sign of mm. 1.

*Croizet Collection. Purchased, 1848.*

**M. 2171.** Part of the left ramus of a mandible, showing the four premolars, m. 1 and m. 2, probably belonging to a small specimen of the present species; from the Lower Miocene of St. Gérard-le-Puy. *Purchased, 1885.*

- 34003.** The greater portion of the left ramus of the mandible, containing the seven cheek-teeth; from the Lower Miocene of Allier. This specimen, which is figured in the accompanying woodcut (fig. 14), agrees precisely with the specimen figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. xiii. figs. 4-6, but exhibits  $\overline{\text{pm. 1}}$  and  $\overline{\text{pm. 2}}$ , which are wanting in that specimen. The first premolar is very small, and is separated by an interval from  $\overline{\text{pm. 2}}$ ; the length of the space occupied by the last six teeth is 0,067, and that by the three true molars 0,0391.

*Bravard Collection. Purchased, 1852.*

Fig. 14.



- 26864.** The greater portion of the right ramus of the mandible, containing the last six cheek-teeth; from the Lower Miocene of Allier. The teeth are slightly smaller than those of the last specimen; there is no trace of  $\overline{\text{pm. 1}}$ . *Pomel Collection. Purchased, 1851.*

- 21904.** The hinder part of the left ramus of the mandible, containing  $\overline{\text{m. 2}}$  and  $\overline{\text{m. 3}}$ ; from the Lower Miocene of Allier. *Croizet Collection. Purchased, 1848.*

- 29051.** The anterior portion of the left ramus of the mandible, containing  $\overline{\text{pm. 2}}$ ,  $\overline{\text{pm. 3}}$ ,  $\overline{\text{pm. 4}}$ , and  $\overline{\text{m. 1}}$ ; from the Lower Miocene of Allier. *Bravard Collection. Purchased, 1852.*

- 26884.** Hinder part of the left ramus of the mandible with  $\overline{\text{m. 2}}$  and  $\overline{\text{m. 3}}$ ; from Allier. *Pomel Collection. Purchased, 1851.*

*Amphitragulus elegans.*—

The greater portion of the left ramus of the mandible; from the Lower Miocene of Allier.  $\frac{1}{2}$ .

28060. Cast of part of the left ramus of a mandible provisionally referred to this species, containing the last four cheek-teeth. The original is from the Miocene of Payerne (Vaud), Switzerland. The specimen was labelled *Palæomeryx scheuchzeri*. The teeth are almost exactly like those of No. 34003; the length of the space occupied by the three true molars is 0,039, and the length of  $\overline{m. 3}$  0,017.

*Presented by John Brown, Esq., 1852.*

28071. Cast of part of a third right lower true molar provisionally referred to this species. The original is from the Miocene of La Molière, Switzerland. The tooth agrees exactly with  $\overline{m. 3}$  of the last specimen.

*Presented by John Brown, Esq., 1852.*

The following young specimens from the Lower Miocene of Allier are provisionally referred to the present species; many of them do not exhibit  $\overline{mm. 1}$  ( $\overline{pm. 1}$ ), which tooth is present in a jaw figured by Filhol in the Ann. Sci. Géol. vol. xi. pl. xiii. figs. 1-3. It is not improbable, however, that this tooth may frequently be very late in making its appearance.

24947. The hinder part of the right ramus of the mandible, containing  $\overline{mm. 4}$  and the three true molars, and  $\overline{pm. 3}$  and  $\overline{pm. 4}$  in alveolo. *Bravard Collection. Purchased, 1852.*

21910. Fragment of the right ramus of the mandible, containing  $\overline{mm. 4}$ ,  $\overline{m. 1}$ , and  $\overline{m. 2}$ .

*Croizet Collection. Purchased, 1848.*

34099. Fragment of the right ramus of the mandible, containing the last three milk-molars and  $\overline{m. 1}$ .

*Bravard Collection. Purchased, 1852.*

26885. Part of the left ramus of the mandible, containing the last three milk-molars and  $\overline{m. 1}$ .

*Pomel Collection. Purchased, 1851.*

34093. The right ramus of the mandible, containing the last three milk-molars and the alveolus of  $\overline{mm. 1}$ .

*Bravard Collection. Purchased, 1851.*

21906. Part of the left ramus of the mandible, containing the last three milk-molars. *Croizet Collection. Purchased, 1848.*

21915. Fragment of the right ramus of the mandible, containing  $\overline{mm. 2}$  and  $\overline{mm. 3}$ . *Croizet Collection. Purchased, 1848.*

34085. Part of the right ramus of the mandible, containing  $\overline{mm. 4}$

and  $\overline{m.1}$ ; from the Lower Miocene of Weissenau, near Mayence. The specimen agrees almost precisely with No. 24947. *Hastings Collection. Purchased, 1855.*

- M. 2172.** Two portions of mandibles of immature individuals with the milk-dentition. *Purchased, 1885.*

***Amphitragulus lemanensis*, Pomel<sup>1</sup>.**

This species is slightly smaller than the last; from which it is distinguished by the narrower  $\overline{pm.3}$ , the shorter  $\overline{pm.2}$ , and the double roots of  $\overline{pm.1}$ .

*Hab. France.*

- 34210.** The greater portion of the right ramus of the mandible, containing the last four cheek-teeth and the alveoli of the first three premolars; from the Lower Miocene of Allier, France. This specimen agrees with the one described by Filhol in the *Ann. Sci. Géol.* vol. xi. art. 1, p. 59. The length of the space occupied by the three true molars is 0,034, the length of  $\overline{pm.4}$  0,082, and that of  $\overline{m.3}$  0,148. *Bravard Collection. Purchased, 1852.*
- 26877.** Part of the right ramus of the mandible, containing the last five cheek-teeth; from the Lower Miocene of Allier. *Pomel Collection. Purchased, 1851.*
- 34209.** Part of the right ramus of the mandible, containing the last five cheek-teeth; from the Lower Miocene of Allier. *Bravard Collection. Purchased, 1851.*
- 26833.** The hinder part of the right ramus of the mandible, containing the three true molars in a well-worn condition; from the Lower Miocene of Allier. *Pomel Collection. Purchased, 1851.*
- 21919.** The anterior portion of the right ramus of the mandible, containing the last three premolars and  $\overline{m.1}$ ; from the Lower Miocene of Allier. *Croizet Collection. Purchased, 1848.*
- 30487.** Hinder part of the left ramus of a mandible provisionally referred to this species, containing the three true molars, in an early stage of wear; from the Lower Miocene of Weissenau, near Mayence. *Hastings Collection. Purchased, 1855.*

<sup>1</sup> Catalogue Méthodique, p. 101 (1853).



34211. Part of the left ramus of the mandible, containing the last five cheek-teeth; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

27599. Fragment of the right maxilla, containing the three true molars in a well-worn condition, not improbably belonging to the present species; from the Lower Miocene of Puy-de-Dôme, France. The teeth in this specimen are slightly smaller than those of *A. elegans*, and agree with the dimensions given by Filhol in the Ann. Sci. Géol. vol. xi. art. 1, p. 59. *Croizet Collection. Purchased, 1848.*

27597. Fragment of a right maxilla, containing pm. 4, m. 1, and m. 2; not improbably belonging to the present species; from the Lower Miocene of Ronzon, near Puy-en-Velay (Haute Loire), France. *Croizet Collection. Purchased, 1848.*

### ***Amphitragulus boulangeri*, Pomel<sup>1</sup>.**

Syn. *Amphitragulus pomeli*, Filhol<sup>2</sup>. *Palæomeryx minor*, H. v. M.<sup>4</sup>  
*Palæomeryx medius*, H. v. Meyer<sup>3</sup>. *Palæomeryx pygmæus*, H. v. M.<sup>5</sup>

Rütimeyer, in the 'Natürliche Geschichte der Hirsche' (Abh. schweiz. pal. Ges. 1883), part 2, p. 91, identifies *P. minor* and *P. pygmæus* with *P. medius*, and records the species from several German localities, from Switzerland, and from La Grive St. Alban (Isère), France. He gives the length of the three lower true molars as 0,023–0,030, and that of m. 3 as 0,011–0,012. The present writer has been totally unable to distinguish German specimens of *P. medius* from French specimens of *Amphitragulus boulangeri*, which apparently passes into the so-called *A. pomeli*; and he has therefore provisionally included all the above-mentioned forms under one species. As all Meyer's species were published without any satisfactory description, he has adopted Pomel's name. In the absence of complete crania it appears impossible to say whether the

<sup>1</sup> Catalogue Méthodique, p. 102 (1853).

<sup>2</sup> Ann. Sci. Géol. vol. xi. art. 1, p. 61 (1880). The volume is dated 1881 on the titlepage.

<sup>3</sup> Neues Jahrb. 1843, p. 387.

<sup>4</sup> *Ibid.* 1838, p. 413.

<sup>5</sup> *Ibid. loc. cit.*

<sup>6</sup> The dimensions of the lower teeth of the French forms (all of which come within Rütimeyer's limits) as given by Filhol are as follows, viz.:—

	<i>A. boulangeri.</i>	<i>A. pomeli.</i>
Length of <u>m. 3</u> .....	0,012	0,0105
„ „ 3 true molars .....	0,027	0,0255
„ „ 7 cheek-teeth .....	0,049	0,045

species should be referred to *Palæomeryx* or *Amphitragulus*; but Pomel's generic reference has provisionally been adopted. The species is of small size.

*Hab.* Europe.

- 30490.** Hinder portion of the left ramus of the mandible, containing the three true molars in an unworn condition; from the Lower Miocene of Weissenau, near Mayence, Hesse Darmstadt. This specimen was labelled *Palæomeryx medius*. The length of the space occupied by the three true molars is 0,028, and the dimensions of  $\overline{m. 3}$  are  $0,012 \times 0,0058$ ; the latter agreeing with those of the specimen of *Amphitragulus boulangeri* described by Filhol in the Ann. Sci. Géol. vol. xi. art. 1, p. 64; it is also very difficult to distinguish from the one figured by the same writer in plate xix. fig. 9 of the same volume under the name of *A. pomeli*. The length of  $\overline{m. 2}$  is 0,008 in all three specimens.

*Hastings Collection. Purchased, 1855.*

- 34306.** Part of the left ramus of the mandible, containing the last five cheek-teeth; from the Lower Miocene of Allier, France. The length of the space occupied by the five teeth is 0,040, as against 0,042 in the specimen described by Filhol as *A. boulangeri*.

*Bravard Collection. Purchased, 1852.*

- 34300.** The greater portion of the right ramus of the mandible, containing all the cheek-teeth except  $\overline{pm. 1}$ ; from the Lower Miocene of Allier. The length of the space occupied by the six teeth is 0,045; the corresponding dimension in Filhol's specimen of *A. boulangeri* being 0,0441.

*Bravard Collection. Purchased, 1852.*

- 34302.** Hinder part of the right ramus of the mandible, containing the last four teeth; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- 34303.** The greater part of the right ramus of the mandible, containing the last five cheek-teeth ( $\overline{m. 1}$  broken); from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- M. 2173.** The greater part of the right ramus of the mandible, showing the last five cheek-teeth; from the Lower Miocene of St. Gérard-le-Puy.

*Purchased, 1885.*

- 21932.** Hinder part of the right ramus of the mandible; from the Lower Miocene of Allier.

*Croizet Collection. Purchased, 1848.*

24942. Hinder part of the left ramus of the mandible, containing the last four cheek-teeth; from the Lower Miocene of St. Gérard-le-Puy, Allier. *Presented by — Talbot, Esq., 1849.*
34304. Hinder part of the left ramus of the mandible, containing the last four cheek-teeth in an almost unworn condition; from the Lower Miocene of Allier.  
*Bravard Collection. Purchased, 1852.*
26897. Fragment of the left ramus of the mandible of a form allied to the present, but with a deeper jaw; from the Lower Miocene of Allier.  
*Pomel Collection. Purchased, 1851.*
30491. Fragment of the left ramus of the mandible, containing  $\overline{m. 1}$  and  $\overline{m. 2}$ ; from the Lower Miocene of Weissenau, near Mayence.  
*Hastings Collection. Purchased, 1855.*
25450. Hinder portion of the right ramus of the mandible, containing the three true molars in an unworn condition; from the Lower Miocene of Weissenau, near Mayence. The length of  $\overline{m. 3}$  is 0,011, and that of the space occupied by the three molars 0,026. This specimen is probably a typical example of Von Meyer's *P. medius*; but it presents no characters by which it can be specifically distinguished from the French specimens already noticed.  
*Purchased, 1850.*
34293. Part of the left ramus of the mandible, containing  $\overline{m. 1}$  and  $\overline{m. 2}$ , and  $\overline{pm. 4}$  in alveolo; from the Lower Miocene of Allier.  
*Bravard Collection. Purchased, 1852.*
21933. Part of the left ramus of the mandible, containing the last three milk-molars and  $\overline{m. 1}$ ; from the Lower Miocene of Allier. This and the following French specimens agree with the one figured by Filhol in the Ann. Sci. Géol. vol. xi. pl. xix. fig. 7, under the name of *A. pomeli*.  
*Croizet Collection. Purchased, 1848.*
30492. Part of the left ramus of the mandible, containing the homologous teeth to the last specimen; from the Lower Miocene of Weissenau, near Mayence.  
*Hastings Collection. Purchased, 1855.*
34289. Part of the left ramus of the mandible, containing  $\overline{mm. 3}$ ,  $\overline{mm. 4}$ , and  $\overline{m. 1}$ ; from the Lower Miocene of Allier.  
*Bravard Collection. Purchased, 1852.*



26897. Part of the right ramus of the mandible, containing the last three milk-molars,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from the Lower Miocene of Allier. *Pomel Collection. Purchased, 1851.*
26896. The hinder part of the right ramus of the mandible, containing  $\overline{mm. 4}$ ,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from the Lower Miocene of Allier. *Pomel Collection. Purchased, 1851.*
34287. Fragment of the left maxilla, containing the last four cheek-teeth; from the Lower Miocene of Allier. This specimen agrees very closely with the palate specimen figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. xvi. fig. 3, under the name of *A. pomeli*<sup>1</sup>. The length of the space occupied by the three true molars measures 0,024. *Bravard Collection. Purchased, 1852.*

***Amphitragulus* (?) *nouleti* (Filhol<sup>2</sup>).**

Syn. *Rutitherium nouleti*, Filhol<sup>3</sup>.

*Dorcatherium nouleti*, Filhol<sup>4</sup>.

This is a small species, described on the evidence of a mandible from the Upper Eocene of Caylux. Rüttimeyer<sup>5</sup> considers the specimen insufficient for generic determination. The true molars are indistinguishable from those of the smaller species of *Amphitragulus* (e. g. *A. gracilis*); and the later premolars have the same form as in that genus, and have not the narrow form of those of *Dorcatherium navi*. The first premolar corresponds in position with that of *Amphitragulus gracilis*; from which resemblance the species is here provisionally referred to *Amphitragulus*.

*Hab.* France.

34299. The greater portion of the right ramus of the mandible, containing all the cheek-teeth except  $\overline{pm. 1}$ , of which the alveolus remains; from the Lower Miocene of Allier, France. This specimen agrees precisely with the type mandible figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xiii. figs. 281-2. There is a diastema between  $\overline{pm. 1}$  and  $\overline{pm. 2}$ , and the inferior border of the ramus is highly

<sup>1</sup> The plate is lettered *Amphitragulus elegans*.

<sup>2</sup> *Comptes Rendus*, vol. lxxii. p. 289 (1876), *Rutitherium*.

<sup>3</sup> *Loc. cit.*

<sup>4</sup> *Ann. Sci. Géol.* vol. viii. art. 1, p. 245 (1877).

<sup>5</sup> *Natürliche Geschichte der Hirsche* (Abh. schweiz. pal. Ges. 1883), pt. 2, p. 70, note.



arcuated. The length of the space occupied by the last six teeth is 0,045. *Bravard Collection. Purchased, 1852.*

34301. The greater part of the left ramus of the mandible, containing the last five cheek-teeth; from the Lower Miocene of Allier. This specimen is precisely similar to the last.

*Bravard Collection. Purchased, 1852.*

### ***Amphitragulus gracilis*, Pomel<sup>1</sup>.**

This species is described only on the evidence of the mandible, and is the smallest form from Allier, the length of  $\overline{m. 3}$  in the type being 0,0087.

*Hab. France.*

34367. Fragment of the left ramus of the mandible, containing the last five cheek-teeth and a part of  $\overline{pm. 2}$ ; from the Lower Miocene of Allier, France. This specimen agrees very closely with the type mandible figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. xix. fig. 11; but  $\overline{m. 3}$  is slightly longer, its length being 0,0105.

*Bravard Collection. Purchased, 1852.*

34290. Fragment of the left ramus of the mandible, containing  $\overline{mm. 3}$ ,  $\overline{mm. 4}$ , and  $\overline{m. 1}$ ; from the Lower Miocene of Allier. This specimen agrees precisely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. xix. fig. 10.

*Bravard Collection. Purchased, 1852.*

### *Bones of Palæomeryx and Amphitragulus from the Lower Miocene of Allier, France.*

From the abundance of the various species of *Palæomeryx* and *Amphitragulus* in the Lower Miocene of Allier, it is probable that the greater number of the larger bones of a ruminant-like structure belong to these genera. It seems, however, to be impossible to distinguish between the vertebræ and proximal limb-bones<sup>2</sup> of the smallest species and those of *Cænotherium*; and some of the medium-sized specimens may belong to *Lophiomeryx*. Owing to the large number of species of *Palæomeryx* and *Amphitragulus*, it appears hopeless to attempt to refer limb-bones or vertebræ to their proper species, especially when there is also a doubt as to their generic determination; but the largest specimens in all probability belong

<sup>1</sup> *Catalogue Méthodique*, p. 102 (1853).

<sup>2</sup> There is, of course, no difficulty in distinguishing the metapodials.

to *P. feignouxi*. The Museum possesses a large collection of these bones; but only a few of the more perfect specimens have been entered here.

21944. The right scapula of a large species, imperfect superiorly (? *P. feignouxi*). *Croizet Collection. Purchased, 1848.*

21944 a. The left scapula, slightly smaller than the last, and imperfect superiorly. This specimen appears to be specifically distinct from the last (? *A. elegans*).  
*Croizet Collection. Purchased, 1848.*

34110. The left humerus of a large species. This specimen agrees precisely with one figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. xviii. figs. 4, 6, and referred to *P. feignouxi*.  
*Bravard Collection. Purchased, 1852.*

34961. The right humerus of a much smaller species.  
*Bravard Collection. Purchased, 1852.*

34114. The right humerus, imperfect proximally, of a slightly smaller form. *Bravard Collection. Purchased, 1852.*

34219. The left humerus, imperfect proximally, of a slightly smaller form. *Bravard Collection. Purchased, 1852.*

34318. The left humerus of a considerably smaller form.  
*Bravard Collection. Purchased, 1852.*

34373. The right humerus, imperfect proximally, of a still smaller form. *Bravard Collection. Purchased, 1852.*

21947. The right radius of a large form.  
*Croizet Collection. Purchased, 1848.*

34231. The right radius, wanting the distal epiphysis, agreeing in size with the last specimen.  
*Bravard Collection. Purchased, 1852.*

40906. The proximal half of a right ulna, agreeing in size with the last specimen. *Presented by C. Falconer, Esq., 1867.*

34227. The proximal half of the left ulna of a smaller form.  
*Bravard Collection. Purchased, 1852.*

26855. The right metacarpus of a large form.  
*Pomel Collection. Purchased, 1851.*

34131. The left metacarpus, slightly smaller than the last.  
*Bravard Collection. Purchased, 1852.*
34239. The left metacarpus of a considerably smaller form.  
*Bravard Collection. Purchased, 1852.*
21954. The left metacarpus, slightly smaller than the last.  
*Croizet Collection. Purchased, 1848.*
26879. The right metacarpus, slightly smaller than the last specimen.  
*Pomel Collection. Purchased, 1851.*
- 26879 a. The left metacarpus, slightly smaller than the last.  
*Pomel Collection. Purchased, 1851.*
34328. The left metacarpus of a much smaller form.  
*Bravard Collection. Purchased, 1852.*
21946. The left metacarpus, similar to the last.  
*Croizet Collection. Purchased, 1848.*
34327. The right metacarpus, similar to the last.  
*Bravard Collection. Purchased, 1852.*
26887. The right metacarpus, similar to the last.  
*Pomel Collection. Purchased, 1851.*
34329. The right metacarpus (imperfect distally), similar to the last.  
*Bravard Collection. Purchased, 1852.*
34385. The right metacarpus of a rather smaller form.  
*Bravard Collection. Purchased, 1852.*
34038. Part of the right innominate of a large form (? *P. feignouxi*).  
*Bravard Collection. Purchased, 1852.*
34136. Part of the right innominate of a rather smaller form.  
*Bravard Collection. Purchased, 1852.*
34134. Part of a left innominate, agreeing in size with the last specimen.  
*Bravard Collection. Purchased, 1852.*
34044. The proximal half of the left femur of a large form (? *P. feignouxi*).  
*Bravard Collection. Purchased, 1852.*
34045. The distal portion of a similar left femur.  
*Bravard Collection. Purchased, 1852.*
34248. The proximal half of the right femur of a smaller form.  
*Bravard Collection. Purchased, 1852.*

26866. The right tibia of a large form.  
*Bravard Collection. Purchased, 1852.*
40906. The proximal two thirds of a similar tibia.  
*Presented by C. Falconer, Esq., 1867.*
34147. The proximal two thirds of a similar tibia.  
*Bravard Collection. Purchased, 1852.*
34250. The right tibia (imperfect superiorly), of slightly smaller size.  
*Bravard Collection. Purchased, 1852.*
34249. The left tibia of a smaller form.  
*Bravard Collection. Purchased, 1852.*
26888. The right tibia of a much smaller form.  
*Pomel Collection. Purchased, 1851.*
34337. The proximal half of a similar left tibia.  
*Bravard Collection. Purchased, 1852.*
- 34338-9, 34388. The distal halves of three similar tibiæ.  
*Bravard Collection. Purchased, 1852.*
34063. The calcaneum of a large form.  
*Bravard Collection. Purchased, 1852.*
34062. A slightly smaller calcaneum.  
*Bravard Collection. Purchased, 1852.*
34343. The calcaneum of a small form.  
*Bravard Collection. Purchased, 1852.*
34051. The astragalus of a large form.  
*Bravard Collection. Purchased, 1852.*
34052. A similar astragalus. *Bravard Collection. Purchased, 1852.*
34058. A similar astragalus. *Bravard Collection. Purchased, 1852.*
33056. A similar astragalus. *Bravard Collection. Purchased, 1852.*
26861. A similar astragalus. *Pomel Collection. Purchased, 1851.*
43629. The astragalus of a smaller form ; from the Miocene of Pfallendorf, near Baden. *Purchased.*
34256. A similar astragalus. *Bravard Collection. Purchased, 1852.*



34345. The astragalus of a still smaller form.  
*Bravard Collection. Purchased, 1852.*
34346. A similar astragalus. *Bravard Collection. Purchased, 1852.*
27527. The naviculo-cuboid of a large form (? *P. feignouxi*).  
*Croizet Collection. Purchased, 1848.*
34059. A slightly smaller naviculo-cuboid, corresponding in size with the astragalus No. 34051.  
*Bravard Collection. Purchased, 1852.*
34060. A similar naviculo-cuboid.  
*Bravard Collection. Purchased, 1852.*
34254. A smaller naviculo-cuboid, corresponding in size with the astragalus No. 34256.  
*Bravard Collection. Purchased, 1852.*
40906. The metatarsus (imperfect at both extremities) of a large form.  
*Presented by C. Falconer, Esq., 1867.*
21952. The metatarsus of a smaller form, corresponding in size to the naviculo-cuboid No. 34254.  
*Bravard Collection. Purchased, 1852.*
26867. A similar metatarsus. *Pomel Collection. Purchased, 1851.*
34237. A slightly larger metatarsus.  
*Bravard Collection. Purchased, 1852.*
26886. The metatarsus of a much smaller form.  
*Pomel Collection. Purchased, 1851.*
21945. A slightly smaller metatarsus.  
*Croizet Collection. Purchased, 1848.*
34348. A slightly smaller metatarsus.  
*Bravard Collection. Purchased, 1852.*
34400. A slightly smaller metatarsus.  
*Bravard Collection. Purchased, 1852.*
- 34275-9. Several proximal phalangeals of a large form.  
*Bravard Collection. Purchased, 1852.*
34402. Two proximal phalangeals of a small form.  
*Bravard Collection. Purchased, 1852.*

- 34085-8. Several second phalangeals of a large form.  
*Bravard Collection. Purchased, 1852.*
34005. The atlas vertebra of a large form.  
*Bravard Collection. Purchased, 1852.*
34214. A smaller atlas vertebra.  
*Bravard Collection. Purchased, 1852.*
34307. A still smaller atlas vertebra.  
*Bravard Collection. Purchased, 1852.*
34006. An early cervical vertebra of a large form.  
*Bravard Collection. Purchased, 1852.*
24942. An early cervical vertebra of a small form.  
*Presented by — Talbot, Esq., 1849.*
- 34215-6. Two dorsal vertebræ.  
*Bravard Collection. Purchased, 1852.*

### Family CAMELIDÆ.

The nearest living allies of this family are the *Tragulidæ*, and it is therefore placed here and followed by the ancestral *Poebrotheriidæ*, as it is inadvisable to separate the *Tragulidæ* from the allied *Dichodontidæ*. The teeth are selenodont and quadricolumnar, but of somewhat simpler structure than those of the Pecora. The navicular and cuboid are separate, but the metapodials unite into a "cannon-bone."

#### Genus **CAMELUS**, Linn.<sup>1</sup>

*Dentition.*—In normal adult specimens of the two existing species the dental formula is I.  $\frac{1}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{3}{2}$ , M.  $\frac{3}{3}$ , that of the milk-teeth being I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Mm.  $\frac{3}{3}$ . The penultimate lower milk-molar is usually shed at a very early age. In one adult skull in the Museum (No. 41. 1. 12. 1) there are four upper premolars on the right side, the last three of which are molariform, the small abnormal tooth being probably a persistent milk-molar. In another recent skull in the Museum there are two lanariform upper premolars on either side, the second pair being probably an instance of reduplication. In the two Siwalik species the permanent dentition is the same as in the recent forms; but in at least one of the fossils the

<sup>1</sup> Syst. Nat. ed. 12, vol. i. p. 90 (1766).

formula of the milk-dentition is  $I. \frac{3}{3}, C. \frac{1}{1}, Mm. \frac{4}{4}$ ; there being one lanariform and three molariform milk-molars. This shows that the missing upper premolar in the existing Camels is  $\overline{pm. 2}$ , the two missing lower teeth being respectively  $\overline{pm. 2}$  and  $\overline{pm. 3}$ . In the lower true molars of both Siwalik species there is a vertical ridge at the antero-external angle found in the genus *Auchenia*, but not in modern Camels. The cervical vertebræ of the fossil species are intermediate between those of *Auchenia* and the modern Camels.

***Camelus sivalensis*, Falconer & Cautley<sup>1</sup>.**

This species is as large as the existing Camel. The enamel of the teeth is rugose, and the inner surface of the lower true molars nearly flat in the middle line, without any vertical ridge in an early condition of wear. The mandible is long and slender.

*Hab.* India.

All the following specimens are from the Pliocene of the Siwalik Hills, and, unless otherwise stated, belong to the *Cautley Collection* (*Presented*, 1842).

**39597.** The hinder part of the cranium, in a crushed condition, (*Fig.*) showing  $\overline{m. 2}$  and  $\overline{m. 3}$  in an early stage of wear. This specimen (which, with those mentioned below, is the type of the species) is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxxxvi. fig. 1. The molars exhibit the characteristic rugosity of the enamel.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

**36664.** The middle portion of the cranium, showing the four last (*Fig.*) cheek-teeth in a middle stage of wear. Figured by Falconer and Cautley, *loc. cit.* pl. lxxxvi. fig. 2. The enamel of the molars is rugose.

*Presented by the Secretary of State for India, 1860.*

**40566.** Fragment of the left maxilla, containing  $\overline{m. 2}$  and  $\overline{m. 3}$ , in (*Fig.*) a well-worn condition. Figured by Falconer and Cautley, *loc. cit.* pl. lxxxvii. fig. 3. The enamel is rugose; and the length of the base of the crown of  $\overline{m. 3}$  0.047.

**40563.** The left half of the middle portion of the cranium, showing (*Fig.*) the three true molars in a well-worn condition. Figured by Falconer and Cautley, *loc. cit.* pl. lxxxvii. fig. 2.

<sup>1</sup> Asiatic Researches, vol. xix. p. 120 (1836).

16405. Fragment of a right maxilla, containing the last four cheek-teeth in a half-worn condition, probably belonging to the present species.
15357. The hinder part of the palate, with the left ramus of the mandible in apposition. Figured by Falconer and Cautley, *loc. cit.* pl. lxxxvi. fig. 3.
40561. The palate of a young individual, showing the last three milk-molars and the germ of the first true molar. Figured by Falconer and Cautley, *loc. cit.* pl. lxxxvii. fig. 1. The three milk-molars are in contact; mm. 3 agrees precisely in form with the abnormal tooth of the existing Camel (B.M. No. 41. 1. 12. 1) mentioned above. The rugose structure of the enamel is visible in the true molar, but not in the milk-molars. The length of the base of the crown of mm. 4 is 0.031. The true molar-tooth corresponds in size with No. 36664.
40567. Fragment of the right maxilla of a young individual, showing (Fig.) mm. 3 and mm. 4. Figured by Falconer and Cautley in the 'Asiatic Researches,' vol. xix. pl. xxi. figs. 12, 13. The teeth are like those of the last specimen, but are in a less worn condition.
17558. The nearly complete mandible of an old male, with a portion of the palate and upper molars in apposition. Figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxxxvi. fig. 5. The whole of the lower dentition is shown, which agrees numerically with that of the existing species.
- 17558 a. Hinder portion of the left ramus of the mandible, showing the hinder half of m. 1 and the complete m. 2 and m. 3 in a well-worn condition. The enamel is strongly rugose, and the middle portion of the inner surface of each tooth nearly flat, without a vertical ridge. The length of the base of the crown of m. 2 is 0.039.
- 17558 b. Fragment of the right ramus of the mandible, containing m. 3 and a portion of m. 2 in a very much worn condition.
15348. Fragment of the right ramus of the mandible, showing (Fig.) mm. 4, m. 1, and m. 2. As the true molars are well worn, the retention of the milk-molar is remarkable. The teeth agree in character with those of No. 17558 a, the length



of the base of the crown of  $\overline{m.1}$  being 0,033. Figured by Falconer and Cautley in the 'Asiatic Researches,' vol. xix. pl. xxi. figs. 8, 11.

15357. Fragment of the right ramus of the mandible of a young individual, showing  $\overline{mm.3}$ ,  $\overline{mm.4}$  (much broken),  $\overline{m.1}$ , and  $\overline{m.2}$ .

40598. Fragment of the left ramus of a mandible, provisionally assigned to this species, showing  $\overline{m.2}$  and  $\overline{m.3}$  in a much worn condition. This specimen agrees in size with the present species, but has a greater concavity on the inner side of  $\overline{m.3}$ , which is, however, probably due to its extremely worn condition.

17557. The hinder portion of the right ramus of the mandible, (*Fig.*) showing  $\overline{m.3}$  in a very much worn condition. This specimen agrees very closely with the last. Figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxxxvii. fig. 6.

16576. The hinder part of the left ramus of the mandible, showing  $\overline{m.3}$  and a part of  $\overline{m.2}$  in a half-worn condition.

16587. Fragment of the right ramus of the mandible of a young individual, showing  $\overline{mm.3}$  and  $\overline{mm.4}$  in a partially worn condition. The last tooth shows the flatness of the inner surface characteristic of the present species.

*Some of the following specimens may belong to the next Species:—*

40569. Fragment of the left ramus of the mandible of a very young (*Fig.*) individual. This specimen is figured by Falconer and Cautley, *op. cit.* pl. lxxxvii. fig. 8: it shows three milk-molars in contact with one another, the first of which ( $\overline{pm.2}$ ) is very minute and not fully protruded;  $\overline{m.3}$  is in *alveolo*.

40564. The extremity of the symphysis of the mandible of a very (*Fig.*) young individual, showing the unworn milk-incisors and canine. Figured by Falconer and Cautley, *op. cit.* pl. lxxxvii. fig. 11.

40565. The symphysis of the mandible of an equally young individual, showing the broken bases of the milk-incisors and canine. Figured by Falconer and Cautley, *op. cit.* pl. lxxxvii. fig. 10.

- 40565 a. Part of the right premaxilla and maxilla of an individual of similar age, showing the base of the milk-canine and mm. 1.
40595. The extremity of the symphysis of the mandible, showing (*Fig.*) the incisors and the bases of the canines. Figured by Falconer and Cautley, *op. cit.* pl. lxxxiii. fig. 2.
40570. Fragment of the left maxilla, with pm. 3 and pm. 4.
40576. The nearly complete left scapula. Figured by Falconer and (*Fig.*) Cautley, *op. cit.* pl. lxxxix. fig. 1.
40577. Proximal extremity of the right humerus. Figured by (*Fig.*) Falconer and Cautley, *op. cit.* pl. lxxxix. fig. 4.
40578. Distal extremity of the right humerus. Figured by Falconer (*Fig.*) and Cautley, *op. cit.* pl. lxxxix. fig. 5.
17111. The adjacent extremities of the associated right humerus (*Fig.*) and radius and ulna. Figured by Falconer and Cautley, *op. cit.* pl. lxxxix. fig. 6.
40580. Distal extremity of the right radius. Figured by Falconer (*Fig.*) and Cautley, *op. cit.* pl. lxxxix. fig. 7.
17125. Distal extremity of a larger right radius.
40605. Distal extremity of the right radius, with the carpus (apparently made up of bones of different individuals) attached.
40603. Distal extremity of the right radius, with the carpus attached.
40586. Distal extremity of the left radius, with the carpus (*Fig.*) attached. Figured by Falconer and Cautley, *op. cit.* pl. lxxxix. fig. 9: the pisiform is now wanting.
40581. The distal extremity of the left radius and the associated (*Fig.*) carpus and greater part of the metacarpus. Figured by Falconer and Cautley, *op. cit.* pl. lxxxix. fig. 8.
40582. The proximal two thirds of the left metacarpus. Figured (*Fig.*) by Falconer and Cautley, *op. cit.* pl. lxxxix. fig. 11.
40583. The distal extremity of a metacarpus. Figured by Falconer (*Fig.*) and Cautley, *op. cit.* pl. lxxxix. fig. 12.

- 40584.** A proximal phalangeal (with sesamoid attached) of a fore  
(Fig.) foot. Figured by Falconer and Cautley, *op. cit.* pl. lxxxix.  
fig. 13.
- 40585.** A rather larger proximal phalangeal of a fore foot. Figured  
(Fig.) by Falconer and Cautley, *op. cit.* pl. lxxxix. fig. 14.
- 40588.** The proximal extremity of the left femur, wanting the head.  
(Fig.) Figured by Falconer and Cautley, *op. cit.* pl. xc. fig. 1.
- 40587.** The head of a femur. Figured by Falconer and Cautley,  
(Fig.) *op. cit.* pl. xc. fig. 2.
- 40589.** The distal extremity of the left femur. Figured by Fal-  
(Fig.) coner and Cautley, *op. cit.* pl. xc. fig. 3.
- 40590.** The distal extremity of a smaller right femur. Figured by  
(Fig.) Falconer and Cautley, *op. cit.* pl. xc. fig. 4.
- 15906.** A patella. Figured by Falconer and Cautley, *op. cit.* pl. xc.  
(Fig.) fig. 6.
- 40591.** The left tibia. Figured by Falconer and Cautley, *op. cit.*  
(Fig.) pl. xc. fig. 3.
- 40592.** The right calcaneum and cuboid. Figured by Falconer and  
(Fig.) Cautley, *op. cit.* pl. xc. fig. 8.
- 40593.** The left astragalus of a small form. Figured by Falconer  
(Fig.) and Cautley, *op. cit.* pl. xc. fig. 11.
- 40597.** The right astragalus of a larger form. Figured by Falconer  
(Fig.) and Cautley, *op. cit.* pl. xc. fig. 10.
- Presented by Dr. Hugh Falconer.*
- 17097.** The left tarsus, wanting the free extremity of the calcaneum.  
(Fig.) Figured by Falconer and Cautley, *op. cit.* pl. xc. fig. 9.
- 18172.** The right metatarsus. Figured by Falconer and Cautley,  
(Fig.) *op. cit.* pl. xc. fig. 13.
- 17091.** The proximal third of the left metatarsus. Figured by Fal-  
(Fig.) coner and Cautley, *op. cit.* pl. xc. fig. 12.
- 14616.** The distal two thirds of the left metatarsus.
- 40610.** The distal extremity of a metapodial.
- 40611.** The distal extremity of a larger cannon-bone.

40612. The distal extremity of a cannon-bone, agreeing in size with No. 40610.
40596. A proximal phalangeal of a hind foot. Figured by Falconer (*Fig.*) and Cautley, *op. cit.* pl. xc. fig. 14.
- 40596 a. The proximal half of a similar phalangeal.
40613. A complete proximal phalangeal.
40623. A smaller proximal phalangeal.
40594. A second phalangeal. Figured by Falconer and Cautley, (*Fig.*) *op. cit.* pl. xc. fig. 15.
40571. The atlas and the anterior half of the axis vertebra. Figured (*Fig.*) by Falconer and Cautley, *op. cit.* pl. lxxxviii. fig. 1.
40572. The broken third cervical vertebra. Figured by Falconer (*Fig.*) and Cautley, *op. cit.* pl. lxxxviii. fig. 2.
18454. The nearly perfect fourth cervical vertebra. Figured by (*Fig.*) Falconer and Cautley, *op. cit.* pl. lxxxviii. fig.
40824. The nearly complete fourth cervical vertebra. In the form of the transverse process this specimen shows a marked resemblance to *Auchenia*.

*Presented by C. Falconer, Esq., 1867.*

40573. The broken fifth cervical vertebra. Figured by Falconer (*Fig.*) and Cautley, *op. cit.* pl. lxxxviii. fig. 4.
40574. Posterior half of a late cervical vertebra. Figured by Falconer and Cautley, *op. cit.* pl. lxxxviii. fig. 5.
40891. An imperfect sixth cervical vertebra. In the large development of the transverse process this vertebra is more like *Auchenia* than living species of *Camelus*, but agrees with the latter in the form of the descending plates.

*Presented by C. Falconer, Esq., 1867.*

40575. The nearly complete seventh cervical vertebra. Figured by (*Fig.*) Falconer and Cautley, *op. cit.* pl. lxxxviii. fig. 6.

### **Camelus antiquus**, Lydekker<sup>1</sup> (*ex* Falc. & Cautl. MS.).

The chief characters by which this species is distinguished from the last are its inferior size, the smooth enamel of the teeth, the concavity and vertical ridge in the middle of the inner surface of

<sup>1</sup> *Rec. Geol. Surv. Ind.* vol. xviii. p. 78 (1885).



the lower true molars (the ridge being only observable in little-worn teeth), and the short deep mandible.

*Hab.* India.

All the specimens are from the Pliocene of the Siwalik Hills, and, unless otherwise stated, belong to the *Cautley Collection* (*Presented*, 1842).

**15347.** Part of the left maxilla, showing all the cheek-teeth except pm. 1 in a much-worn condition. This specimen indicates a very small animal, the length of the space occupied by the three true molars being 0,104, and the length of the crown of m. 3 0,042. The enamel is smooth. In *C. sivalensis*, No. 48563, which has the teeth in nearly the same condition of wear, the length of the space occupied by the three true molars is 0,124.

**40562.** The imperfect cranium of a young individual, in two pieces. (*Fig.*) Figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxxxvi. fig. 2. On the left side the specimen shows mm. 3 (broken) and mm. 4 in a well-worn condition, m. 1 in an early stage of wear, and m. 3 in *alveolo*. It is not shown whether mm. 2 was present. The teeth have a smooth enamel, and are very much smaller than those of the young cranium of *C. sivalensis*, the length of the base of the crown of mm. 4 being only 0,025. The first true molar corresponds in size with that of No. 15347.

**16165.** The greater part of the left ramus of the mandible, showing the last four cheek-teeth in a well-worn condition. This specimen is figured by Falconer and Cautley, *op. cit.* pl. lxxxvii. fig. 5. The teeth are nearly in the same condition of wear as those of *C. sivalensis* (No. 17558), and therefore show the characteristic difference in the form of the inner surface. The specimen indicates an animal considerably smaller than *C. sivalensis* (No. 17558), but with a much deeper jaw and a shorter interval between pm. 1 and pm. 4, and with a perfectly smooth enamel to the molars. The following dimensions show the difference between the two specimens:—

	<i>C. antiquus.</i> (No. 16165.)	<i>C. sivalensis.</i> (No. 17558.)
Length of <u>m. 3</u> . . . . .	0,058	0,065
Depth of jaw at <u>m. 3</u> . . . . .	0,076	0,066
"      " <u>pm. 4</u> . . . . .	0,053	0,044
Interval between <u>pm. 1</u> and <u>pm. 4</u>	0,058	0,084

40568. Part of the left ramus of the mandible, showing the last four cheek-teeth ( $\overline{m. 3}$  imperfect) in an early stage of wear. The teeth correspond in size with those of the last specimen, the length of the base of the crown of  $\overline{m. 2}$  being 0.033. This tooth shows the characteristic median hollow at the base and the ridge at the summit of the inner surface. The enamel is perfectly smooth. The mandible is relatively slender; but this is probably due to immaturity.
16577. Part of the left ramus of the mandible of an immature individual, showing  $\overline{m. 1}$  and  $\overline{m. 2}$  in an early stage of wear, and parts of  $\overline{pm. 4}$  and  $\overline{m. 3}$  in alveolo.
39599. Part of the right ramus of the mandible, showing the outer halves of the three true molars. This specimen agrees with the present species in its small size and the great depth of the horizontal ramus.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

Genus **AUCHENIA**, Illiger<sup>1</sup>.

Including *Lama*, Cuvier<sup>2</sup>.

*Palauchenia*, Owen<sup>3</sup>.

*Palæolama*, P. Gervais<sup>4</sup>.

(?) *Hemiauchenia*, H. Gervais and Ameghino<sup>5</sup>.

*Dentition*:—In the adult living species the normal formula is  $I. \frac{1}{3}, C. \frac{1}{1}, Pm. \frac{2}{2}, M. \frac{3}{3}$ ; but  $\overline{pm. 3}$  is often absent; the lanariform  $\overline{pm. 1}$  of *Camelus* is the upper tooth which has disappeared. In the so-called *Palauchenia* (= *Palæolama*, *teste* H. Gervais)  $\overline{pm. 3}$  is always present, and  $\overline{pm. 1}$  exists in a specimen figured by Owen<sup>6</sup>. In *Hemiauchenia* there are  $Pm. \frac{3}{3}$ . In the opinion of the present writer, the mere presence of one or more additional premolars is not a character of generic value, and he is therefore indisposed to accept *Palauchenia*; but it is hinted that there are differences in the structure of the teeth of *Hemiauchenia* which may indicate generic distinction. Further descriptions are required to determine the

<sup>1</sup> Prodrromus, p. 103 (1811).

<sup>2</sup> Tableau Générale, appended to 'Leçons d'Anatomie Comparée, 1st ed. (1800). Subsequently abandoned for *Auchenia*.

<sup>3</sup> Phil. Trans. 1870, p. 65.

<sup>4</sup> Not found. Quoted by H. Gervais and Ameghino.

<sup>5</sup> Mammifères Fossiles de l'Amérique Méridionale, p. 121 (1880).

<sup>6</sup> Gervais and Ameghino give the number of lower premolars in *Auchenia* as 1, and in *Palauchenia* (*Palæolama*) 2.

affinity of the North-American *Pliauchenia* (Pm.  $\frac{3}{3}$ ) and *Procamelus* (Pm.  $\frac{4}{4}$ ). For *Auchenia magna*, see Addenda.

### **Auchenia, sp. 1.**

In the absence of figures, it appears impossible to say whether the present form is identical with any of the numerous fossil species recorded by H. Gervais and Ameghino (*op. cit.* pp. 115-123). The present form is considerably larger than the Guanaco.

*Hab.* S. America.

18921. Fragment of the right maxilla, showing the five cheek-teeth; from a cavern in Minas Geraes, Brazil. It is possible that a minute pm. 2 may have been present; pm. 3 is relatively much larger than in the Guanaco. The following measurements indicate the difference in size of the fossil and recent forms:—

	Fossil.	Recent.
Length of space occupied by three true molars ..	0,072	0,061
Ditto by two premolars .....	0,034	0,021
Length of pm. 3 .....	0,016	0,0085

*Claussen Collection. Purchased, 1845.*

18920. The anterior part of the palate, showing the canine and incisor; from a cavern in Minas Geraes. "

*Claussen Collection. Purchased, 1845.*

18922. Two lower true molars; from a cavern in Minas Geraes.

*Claussen Collection. Purchased, 1845.*

37665. Part of the left ramus and symphysis of the mandible of a young individual, agreeing in size with the preceding, and showing mm. 3, mm. 4, and m. 1 in alveolo; from the Pleistocene of Buenos Ayres.

*Bravard Collection. Purchased, 1854.*

*The following limb-bones agree in size with this species.*

37656. The right radius and ulna, imperfect distally; from the Pleistocene of Buenos Ayres.

*Bravard Collection. Purchased, 1854.*

18934. The right carpus; from a cavern in Minas Geraes.

*Claussen Collection. Purchased, 1845.*

18926. The left metacarpus; from a cavern in Minas Geraes.

*Claussen Collection. Purchased, 1845.*

37661. The left metatarsus; from the Pleistocene of Buenos Ayres.

*Bravard Collection. Purchased, 1854.*

18923. Three proximal phalangeals; from the caverns of Minas Geraes. *Claussen Collection. Purchased, 1845.*
37457. A proximal phalangeal; from the Pleistocene of Buenos Ayres. *Bravard Collection. Purchased, 1854.*
- 18923 a. A second phalangeal; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845.*

**Auchenia**, sp. 2.

This species agrees in size with the Guanaco.

*Hab.* S. America.

43244. Fragment of the right ramus of the mandible, containing the three true molars, not fully protruded; from the Pleistocene of Buenos Ayres.

*Presented by Señor J. L. Fontana, 1871.*

*The following limb-bones agree in size with this species.*

37666. The distal portion of a cannon-bone; from the Pleistocene of Buenos Ayres. *Bravard Collection. Purchased, 1854.*
37670. The distal extremity of a cannon-bone; from the Pleistocene of Buenos Ayres. *Bravard Collection. Purchased, 1854.*
37674. A proximal phalangeal; from the Pleistocene of Buenos Ayres. *Bravard Collection. Purchased, 1854.*

Family POËBROTHERIIDÆ.

This family is related to the *Camelidæ* in the structure of its cervical vertebrae; but in other respects is said to be allied to the *Tragulidæ*. The teeth are selenodont; the metapodials are not fused into a cannon-bone; and the navicular and cuboid are separate; there is a trapezium.

Genus **POËBROTHERIUM**, Leidy<sup>1</sup>.

*Dentition*:—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ .

**Poebrotherium wilsoni**, Leidy<sup>2</sup>.

*Hab.* North America.

40958. Cast of the type cranium and mandible. The original is

<sup>1</sup> Proc. Ac. Nat. Sci. Philad. vol. iii. p. 322 (1847, vol. dated 1848).

<sup>2</sup> *Loc. cit.*



from the Miocene of Nebraska, and is preserved in the Museum of Natural Sciences at Philadelphia; it is figured in the Smith. Contrib. Know. vol. vi. pl. 1 (1854).

*Purchased*, 1868.

### Family TRAGULIDÆ.

The fossil forms apparently indicate a transition from the typical genus to the *Cervidæ* (through *Prodremotherium*) on the one hand, and on the other to the *Dichodontidæ*, so that no exact definition of the family can be given. In the typical form, the cheek-teeth in front of pm. 4 are simply secant, and thereby differ from those of the *Cervidæ*; *Prodremotherium*, however, is somewhat intermediate in this respect. All the genera are unprovided with antlers. In the recent forms the navicular and cuboid are united; but the median metapodials either unite very late, or remain separate throughout life (*Hyomoschus*). The teeth are selenodont in structure, the upper true molars having four columns.

#### Genus **PRODREMOTHERIUM**, Filhol<sup>1</sup>.

Rütimeyer places this genus in the present family; the penultimate upper premolar is not, however, of the simply secant form which is characteristic of the existing *Tragulidæ*, but has an inner expansion, foreshadowing the inner crescent of the *Cervidæ*. The bones referred to this genus by Filhol show that the metapodials are fused into a cannon-bone. The dental formula is I.  $\frac{2}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{3}{3}$ , M.  $\frac{3}{3}$ .

#### **Prodremotherium elongatum**, Filhol<sup>2</sup>.

*Hab.* France.

- M. 1415.** Fragment of the left maxilla, containing the last five cheek-teeth; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen agrees precisely with the one figured by Filhol in the Ann. Sci. Géol. vol. viii. pl. xi. fig. 268. The length of the space occupied by the three true molars is 0,027, and the length of m. 3 0,010, and its width 0,011.

*Purchased*, 1884.

- M. 1425.** Fragment of the left maxilla, containing the last five

<sup>1</sup> Ann. Sci. Géol. vol. viii. art. 1, p. 228 (1877).

<sup>2</sup> *Loc. cit.*

cheek-teeth, in an almost unworn condition; from the Upper Eocene of Caylux. *Purchased, 1884.*

**M. 1426.** Fragment of the left maxilla, containing the last five cheek-teeth, in a well-worn condition; from the Upper Eocene of Caylux. *Purchased, 1884.*

**M. 1423.** Fragment of the left maxilla, containing the last four cheek-teeth, in a partially worn condition; from the Upper Eocene of Caylux. There is a distinct cingulum to the true molars in this specimen. *Purchased, 1884.*

**M. 1501.** Fragment of the left maxilla, containing the three pre-molars, in a well-worn condition; from the Upper Eocene of Caylux. *Purchased, 1884.*

**M. 1429.** Fragment of the right maxilla, containing pm. 4 and m. 1; from the Upper Eocene of Caylux. *Purchased, 1884.*

**M. 1414.** Part of the right ramus of the mandible, containing the last four cheek-teeth; from the Upper Eocene of Caylux. This specimen agrees precisely with the nearly complete left ramus figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xi. fig. 265, and exhibits the characteristic slender form. The length of the space occupied by the three true molars is 0,033, the length of m. 3 0,014, the depth of the jaw in front of pm. 4 0,0135, and behind m. 3 0,017. *Purchased, 1884.*

*The following limb-bones from the Upper Eocene of Caylux probably belong to Prodremotherium, or some of the allied genera. Purchased, 1885. There are other specimens in the Collection.*

**M. 2236.** The right humerus, wanting the head.

**M. 2234.** The left radius and ulna.

**M. 2235.** The right radius.

**M. 2240.** The left femur.

**M. 2239.** The left tibia, perhaps associated with the last.

**M. 2241.** Two imperfect specimens of the metacarpus.

Genus **TRAGULUS**, Pallas<sup>1</sup> (*ex* Brisson).

*Dentition*:—I.  $\frac{0}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{3}{3}$ , M.  $\frac{3}{3}$ .

**Tragulus sivalensis**, Lydekker<sup>2</sup>.

*Hab.* India.

- M. 2249.** The crown of the first left upper true molar, in a somewhat weathered condition; from the Siwaliks of the Brámapútra Valley, India. This specimen agrees precisely with the corresponding tooth of *Tragulus meminna*, and is slightly smaller than the type third upper molar of the Siwalik form, figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 118, and reproduced in the accompanying woodcut (fig. 15).

*Presented by General Hardwicke.*

Fig. 15.



*Tragulus sivalensis*.—The third left upper true molar; from the Siwaliks of the Punjab. †. (From the 'Palæontologia Indica.')

- M. 2250.** The first two lobes of the third right lower true molar, in an early condition of wear; from the same locality as the last. This tooth agrees almost exactly with that of *T. meminna*.

*Presented by General Hardwicke.*

- M. 2250 a.** Fragments of other lower molars; from the same locality.

*Presented by General Hardwicke.*

- M. 2251.** Distal extremity of the radius; from the same locality.

*Presented by General Hardwicke.*

<sup>1</sup> Spicilegia Zoologica, vol. xiii. p. 27 (1779).

<sup>2</sup> Rec. Geol. Surv. Ind. vol. xv. p. 30 (1882).

**M. 2252.** Shaft of a metapodial ; from the same locality.

*Presented by General Hardwicke.*

**M. 2253.** Greater portion of a rib ; from the same locality.

*Presented by General Hardwicke.*

Genus **DORCATHERIUM**, Kaup<sup>1</sup>.

Syn. *Hyomoschus*, Gray<sup>2</sup> (*teste* Rüttimeyer).

*Dentition*:—I.  $\frac{0}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{3}{(3-4)}$ , M.  $\frac{3}{3}$ . The true molars of *Dorcatherium* are more complex than those of *Palæomeryx*; but the narrow, secant premolars of the former and of *Tragulus* indicate affinity with generalized forms like *Dichodon* and *Xiphodon*.

**Dorcatherium naui**, Kaup<sup>3</sup>.

Syn. *Dorcatherium vindobonense*, H. v. Meyer<sup>4</sup>.

*Dicroceros crassus*, Lartet<sup>5</sup>.

*Hyomoschus larteti*, Pomel<sup>6</sup>.

*Hyomoschus crassus*, Fraas<sup>7</sup>.

*Hab.* Europe.

**40632.** The nearly complete cranium and mandible, in a partially crushed condition ; from the Upper Miocene of Eppelsheim, Hesse-Darmstadt. This beautiful specimen is figured by Kaup in the *Oss. Foss. d. Darmstadt*, pt. 5, pl. xxiii. A ; it shows the whole of the dentition, and has four lower premolars, in which respect it differs from the living *Tragulidæ*. The specimen is noticed by Rüttimeyer in the ' *Natürliche Geschichte der Hirsche* ' (*Abh. schw. pal. Ges.* 1883), pt. 2, pp. 72, 73, on whose authority the synonymy is given. *Purchased*, 1867.

**21853.** Part of the right ramus of the mandible, containing the third and fourth premolars and the first and second true molars ; from the Middle Miocene of Sansan (Gers), France. *Croizet Collection. Purchased*, 1848.

**40769.** The penultimate left lower premolar ; from the Middle Miocene of Sansan. *Presented by C. Falconer, Esq.*, 1867.

<sup>1</sup> *Oss. Foss. d. Darmstadt*, pt. 5, p. 92 (1836).

<sup>2</sup> *Ann. Mag. Nat. Hist.* vol. xvi. p. 350 (1845).

<sup>3</sup> *Loc. cit.*

<sup>4</sup> *Neues Jahrb.* 1846, p. 471.

<sup>5</sup> *Notice sur la Colline de Sansan*, p. 35 (1853).

<sup>6</sup> *Comptes Rendus*, vol. xxi. p. 17 (1851).

<sup>7</sup> *Fauna von Steinheim*, p. 29 (1870).



- 21856 a. The right naviculo-cuboid ; from the Middle Miocene of Sansan. *Croizet Collection. Purchased, 1848.*
21858. The astragalus ; from the Middle Miocene of Sansan. *Croizet Collection. Purchased, 1848.*
21856. The right metatarsus ; from the Middle Miocene of Sansan. *Croizet Collection. Purchased, 1848.*
21852. The proximal extremity of the left metatarsus ; from the Middle Miocene of Sansan. *Croizet Collection. Purchased, 1848.*
21855. Two portions of metapodial bones ; from the Middle Miocene of Sansan. *Croizet Collection. Purchased, 1848.*

**Dorcatherium minus**, Lydekker <sup>1</sup>.

This is a small species, the upper molars of which agree very closely with those of *D. navi* ; but in the absence of the premolars the generic determination may be doubtful ; although it is highly probable that this species at least is generically identical with the African *Hyomoschus*.

*Hab.* India.

19043. Two fragments of the maxilla, one containing mm. 3, mm. 4, and m. 1, and the other mm. 3 and mm. 4 ; from the Pliocene of the Siwalik Hills, India. The teeth of these specimens agree precisely with the type specimens figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. i. pl. viii. figs. 3 and 7. *Cautley Collection. Presented, 1842.*

**Dorcatherium majus**, Lydekker <sup>2</sup>.

This species is larger than *D. navi*, but its upper molars (by which it is solely known) are very similar ; they have a very prominent cingulum.

*Hab.* India.

40860. A right upper true molar ; from the Siwaliks of Kúshalghar, Punjab, India. This specimen resembles precisely the type molars figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. . pl. vii. figs. 4, 6, 9, 10, 11. *Presented by C. Falconer, Esq., 1867.*

<sup>1</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. i. p. 64 (1876).

<sup>2</sup> *Ibid.* p. 62.

Genus **BACHITHERIUM**, Filhol<sup>1</sup>.

This genus is only known by some portions of the mandible and maxilla; it is said to be closely allied to *Gelocus*, but differs by wanting the first lower premolar; the dental formula being  $I. \frac{2}{3}, C. \frac{2}{1}, Pm. \frac{3}{3}, M. \frac{3}{3}$ . The upper cheek-teeth so closely resemble those of *Prodremotherium*, that it is very difficult to distinguish them. The position of the genus in the present family is provisional.

**Bachitherium curtum**, Filhol<sup>2</sup>.

Syn. *Gelocus curtus*, Filhol<sup>3</sup>.

*Bachitherium medium*, Filhol<sup>4</sup>.

There is some confusion in the nomenclature of this form. Two imperfect mandibles were figured by Filhol in the Ann. Sci. Géol. vol. viii. pl. xi. fig. 257, pl. xx. fig. 340, under the name of *Gelocus curtus*. In the Ann. Soc. Sci. Phys. Nat. Toulouse, 1882, p. 124, the first of these is named *Bachitherium medium*. In the Ann. Sci. Géol. vol. xii. art. 3, p. 241, note 1, it is, however, stated that the specimen was described in the passage last cited as *B. curtum*. As both specimens appear to belong to the same species, and the name *curtum* has the priority, this name is adopted here.

*Hab.* France.

- M. 2153.** Fragment of the left maxilla, containing the last four cheek-teeth; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. The teeth of this specimen agree precisely with those described by Filhol in the Ann. Soc. Sci. Phys. Nat. Toulouse, 1882, pp. 126-7; the length of the space occupied by the three true molars is 0.0204.

*Purchased*, 1885.

- M. 2154.** Fragment of the left maxilla, containing mm. 3, mm. 4, and m. 1; from the Upper Eocene of Caylux.

*Purchased*, 1885.

- M. 2157.** Part of the right ramus of the mandible, containing the last five cheek-teeth; from the Upper Eocene of Caylux. The length of the space occupied by the three true molars is 0.027.

*Purchased*, 1885.

<sup>1</sup> Comptes Rendus, vol. xciv. p. 138 (1882).

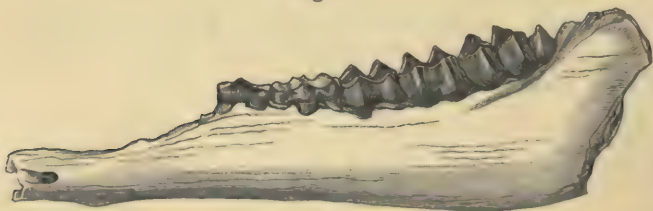
<sup>2</sup> Ann. Sci. Géol. vol. viii. art. 1, p. 236 (1877), *Gelocus*.

<sup>3</sup> *Loc. cit.*

<sup>4</sup> Ann. Soc. Sci. Phys. Nat. Toulouse, 1882, p. 124.

- M. 2158.** Part of the right ramus of the mandible, containing the last four cheek-teeth ; from the Upper Eocene of Caylux. The length of the space occupied by the three true molars is 0,025, and the length of  $\overline{m. 3}$  0,012. *Purchased, 1885.*
- M. 2150.** Fragment of the left ramus of the mandible, containing all the cheek-teeth except  $\overline{m. 3}$  ; from the Upper Eocene of Caylux. The length of the space occupied by the three premolars is 0,0195 ; it is highly probable that this specimen belongs to the same individual as the maxilla No. M. 2153. *Purchased, 1885.*
- M. 1429.** Part of the right ramus of the mandible, containing  $\overline{pm. 4}$ ,  $\overline{m. 1}$ ,  $\overline{m. 2}$ , and the first lobe of  $\overline{m. 3}$  ; from the Upper Eocene of Caylux. This jaw agrees precisely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. iii. fig. 257. *Purchased, 1884.*
- M. 1429 a.** Two fragments of the hinder portion of the mandible ; from the Upper Eocene of Caylux. *Purchased, 1884.*
- M. 1427.** The nearly complete left ramus of the mandible of a young individual, containing all the cheek-teeth except  $\overline{mm. 2}$ , of which the alveolus remains ; from the Upper Eocene of Caylux. This specimen, which is represented in the woodcut (fig. 16), agrees with the type mandibles in the

Fig. 16.



*Bachitherium curtum*.—The left ramus of the mandible of a young individual from the Upper Eocene of Caylux.  $\frac{1}{4}$ .

form and size of the true molars, in the long diastema, the slenderness of the ramus, and its straight inferior border, and the presence of two mental foramina, one of which is situated immediately behind the alveolus of the canine, and the other below  $\overline{mm. 2}$ . The length of the

<sup>1</sup> Not shown in the woodcut.

space occupied by the three true molars is 0,025, and that of the diastema 0,0225. *Purchased, 1884.*

- M. 2155.** Hinder part of the left ramus of the mandible, containing  $\overline{m. 2}$  and  $\overline{m. 3}$ ; from the Upper Eocene of Caylux. The length of  $\overline{m. 3}$  is 0,011. *Purchased, 1885.*
- M. 1428.** The greater part of the left ramus of the mandible of a young individual, containing the milk-molars,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from the Upper Eocene of Caylux. This specimen is similar to No. M. 1427; the length of the space occupied by the three milk-molars is 0,023. *Purchased, 1884.*
- M. 2156.** Part of the right ramus of the mandible of an immature individual, containing  $\overline{mm. 4}$ ,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from the Upper Eocene of Caylux. The length of  $\overline{mm. 4}$  is 0,009. *Purchased, 1885.*
- M. 1491.** Anterior portion of the right ramus of the mandible of a young individual, showing the three milk-molars; from the Upper Eocene of Caylux. The length of the space occupied by the three teeth is 0,025, and the length of  $\overline{mm. 4}$  0,0085. *Purchased, 1884.*
- M. 1429 b.** Fragment of the left ramus of the mandible of a species of the present genus, showing  $\overline{mm. 3}$  and  $\overline{mm. 4}$  in an unworn condition; from the Upper Eocene of Caylux. The length of  $\overline{mm. 4}$  is 0,0096. *Purchased, 1884.*

***Bachitherium insigne*, Filhol<sup>1</sup>.**

Syn. *Gelocus insignis*, Filhol<sup>2</sup>.

This species is referred to the present genus in the Ann. Soc. Sci. Phys. Nat. Toulouse, 1882, p. 122, where the type specimens are described, although not figured. The species is of larger size than the last. In the absence of figures the following determinations are provisional.

*Hab.* France.

- M. 1424.** Fragment of the left maxilla, containing the last four cheek-teeth; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. The length of the space occupied by

<sup>1</sup> Bull. Soc. Philom. Paris, sér. 6, vol. xii. p. 16 (1876, vol. dated 1877), *Gelocus*.

<sup>2</sup> *Loc. cit.*



the three true molars is 0,0302, which is practically the same as in the specimen described by Filhol. There is a distinct cingulum to the molars, which are larger than those of *Prodremotherium elongatum*. *Purchased, 1884.*

- M. 2152.** Fragment of the left maxilla, containing the three true molars, and a fragment of mm. 4; from the Upper Eocene of Caylux. The length of the space occupied by the three molars is 0,0295. *Purchased, 1885.*

- M. 1416.** Fragment of the right maxilla, containing the last five cheek-teeth; from the Upper Eocene of Caylux. These teeth agree in size with those of the last specimen, but have a less distinct cingulum; the two specimens may be specifically distinct. *Purchased, 1884.*

- M. 1417.** Fragment of the right maxilla, containing the last four cheek-teeth; from the Upper Eocene of Caylux. The teeth agree with those of the last specimen. *Purchased, 1884.*

- M. 1471.** Fragment of a left maxilla, with m. 1 and m. 2, perhaps belonging to the present species; from the Upper Eocene of Caylux. *Purchased, 1884.*

In the attenuated character of their premolars, and the distinct pit at the posterior border of pm. 4, the following specimens agree with the present genus, although neither of them accords exactly with the description of the type mandible of the present species.

- M. 1420.** Part of the right ramus of the mandible, containing the six cheek-teeth (pm. 4 broken), in a well-worn condition; from the Upper Eocene of Caylux. The length of the space occupied by the three true molars is 0,036, and the depth of the ramus in front of m. 1 0,0166, and behind m. 3 0,0215. *Purchased, 1884.*

- M. 1422.** Fragment of the left ramus of a mandible, containing mm. 4, m. 1, and m. 2, and probably belonging to the same species as the last; from the Upper Eocene of Caylux. *Purchased, 1884.*

- M. 1421.** Part of the left ramus of a mandible, containing the last four cheek-teeth, in an unworn condition, and probably belonging to a different species from the two last; from the Upper Eocene of Caylux. The length of the space

occupied by the three true molars is 0,033, and the depth of the ramus in front of  $\overline{m.1}$  0,0156, and behind  $\overline{m.3}$  0,027. Purchased, 1884.

### Family DICHODONTIDÆ.

In the type genus the full complement of the typical Eutherian dentition is developed; but it is not yet known whether the upper incisors were present in some of the other genera. The cheek-dentition is selenodont, the upper true molars being quadricolumnar; but in *Lophiomeryx* some of the columns are imperfectly developed. The family appears so closely connected with the *Tragulidæ*, that it is difficult to draw any distinctive division, unless it be eventually found that upper incisors are always present. The foot-structure in those forms in which it is known presents considerable specialization. *Chæromeryx*, which is provisionally included in the family, appears to indicate affinity with *Merycopotamus pusillus*.

#### Genus **GELOCUS**, Aymard <sup>1</sup>.

The upper molars of this genus have extremely low columns with wide open valleys; the external surface of the hinder lobe of each of the outer columns is markedly concave, indicating affinity to *Dichodon*. The navicular and cuboid bones of the tarsus are united; and the hinder metapodials fused into a cannon-bone. The dental formula is I.  $\frac{2}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{3}{4}$ , M.  $\frac{3}{3}$ .

#### **Gelocus communis**, Aymard <sup>2</sup>.

Syn. *Anthracotherium minutum*, Blainville <sup>3</sup>.

*Amphitragulus communis*, Aymard <sup>4</sup>.

*Hab.* France.

- 27596.** Fragment of the left ramus of the mandible, containing the last two premolars and the three true molars; from the Lower Miocene of Ronzon, near Puy-en-Velay (Haute Loire), France. The space occupied by the three true molars measures 0,024; which agrees with typical specimens. *Croizet Collection. Purchased, 1848.*

<sup>1</sup> Ann. Soc. Agric. Sci. Le Puy, 1855 (*teste* P. Gervais).

<sup>2</sup> *Ibid.* vol. xii. p. 247 (1848), *Amphitragulus* (*teste* Filhol).

<sup>3</sup> 'Ostéographie,' Genus *Anoplotherium*, p. 132 (1846). This specific name has the priority, but as it is not applicable when transferred to *Gelocus* it has been dropped.

<sup>4</sup> *Loc. cit.*

- 27798.** Two fragments of associated rami of the mandible; from the Lower Miocene of Ronzon. This specimen shows the last three premolars and the first two true molars.

*Croizet Collection. Purchased, 1848.*

- 27799.** Part of the right ramus of the mandible, showing the last milk-molar,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from the Lower Miocene of Ronzon.

*Croizet Collection. Purchased, 1848.*

- M. 1396.** Three cheek-teeth, and the metacarpus, wanting the distal epiphysis; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. The metacarpus agrees in general characters with the one figured by Filhol in the *Ann. Sci. Géol.* vol. xii. pl. xxxi. fig. 190, but is of rather larger size.

*Purchased, 1884.*

### Genus **LOPHIOMERYX**, Pomel<sup>1</sup>.

*Dentition*:—I.  $\frac{2}{3}$ , C.  $\frac{2}{1}$ , Pm.  $\frac{2}{4}$ , M.  $\frac{3}{3}$ .

This genus, of which only the mandible has been hitherto known with certainty, is placed by Rüttimeyer, in the 'Natürliche Geschichte der Hirsche' (Abh. schw. Pal. Ges. 1883, pt. 2, p. 60), between *Galocus* and *Dichodon*. In the type species the first lobe of the lower molars is somewhat like those of *Anoplotherium*, while the second is ruminant-like. A lower jaw from the French Upper Eocene, figured by Filhol in the *Ann. Soc. Sci. Phys. Nat. Toulouse*, 1882, pl. x., under the name of *Metrioitherium mirabile*, evidently indicates an allied form with a less specialized hinder lobe to the molars, and might perhaps be referred to the present genus. The family position of the genus is provisional, and its dentition seems to retain traces of affinity with the *Perissodactyla*. A second species is described in the *Addenda*.

### **Lophiomeryx chalaniati**, Pomel<sup>2</sup>.

This species occurs both in the Upper Eocene and the Lower Miocene.

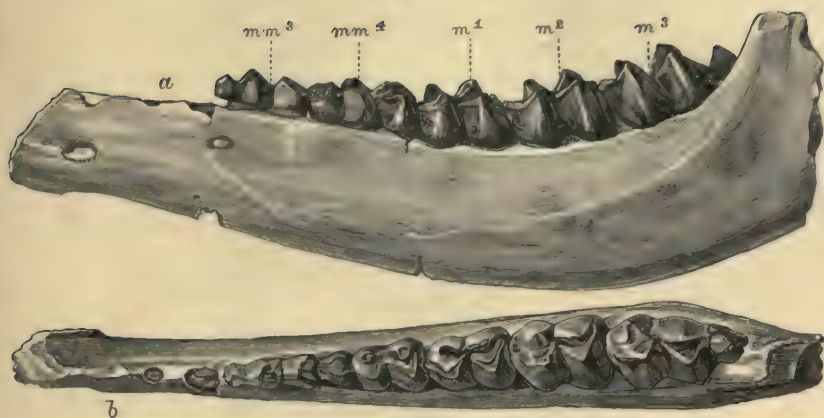
*Hab.* France.

- 34960.** The greater part of the left ramus of the mandible of an adolescent individual, containing mm. 3, mm. 4, and the three true molars; from the Lower Miocene of Allier, France. In this specimen, which is represented in the accompanying woodcut (fig. 17), the last true molar has a

<sup>1</sup> *Catalogue Méthodique*, p. 97 (1853).

<sup>2</sup> *Ibid.* p. 98.

Fig. 17.



*Lophiomyx chalaniati*.—The left ramus of the mandible; from the Lower Miocene of Allier. †.

length of 0,019, and the space occupied by the three true molars measures 0,0435. The teeth precisely resemble the unworn molar figured by Gaudry in 'Les Enchaînements du Monde Animal—Mammifères Tertiaires,' fig. 114, p. 95 (1878). *Bravard Collection. Purchased, 1852.*

- M. 2133.** The greater part of the left ramus of the mandible of an adolescent individual, containing the last three milk-molars, and the first and second true molars; from the Upper Eocene of Caylux (Tarn-et-Garonne), France.  
*Purchased, 1885.*

- M. 2134.** The hinder portion of the left ramus of the mandible, showing the three true molars; from the Upper Eocene of Caylux.  
*Purchased, 1885.*

- M. 2135.** Anterior portion of the left ramus of the mandible of an adolescent individual, containing the last three milk-molars; from the Upper Eocene of Caylux.  
*Purchased, 1885.*

- 27802.** Fragment of the left ramus of the mandible with  $\overline{m. 2}$ ; from the Lower Miocene of Sauvetat (Puy-de-Dôme), France.  
*Croizet Collection. Purchased, 1848.*

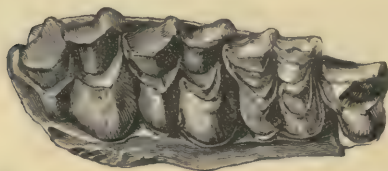


27797. Fragment of the right ramus of the mandible, with m. 2 and m. 3; from the Lower Miocene of Sauvetat. This is the specimen noticed by Gervais in the Zool. et Pal. Françaises, 2nd ed. p. 156.

*Croizet Collection. Purchased, 1848*

- M. 2136.** Fragment of the right maxilla, containing pm. 4 and the three true molars; from the Upper Eocene of Caylux. (*Fig.*) This specimen, which is figured in the accompanying woodcut (fig. 18), agrees so exactly in size with the

Fig. 18.



*Lophiomeryx chalaniati*.—Part of the right maxilla; from the Upper Eocene of Caylux. †.

mandibles that there is every probability that it belongs to the present species; a maxilla, which is provisionally referred to the same, is noticed, although not figured, by Filhol in the Ann. Sci. Géol. vol. viii. art. 1, p. 227. The true molars of the present specimen are like those of a primitive ruminant, but the second inner crescent is incompletely developed in m. 2, and in m. 3 is rudimentary. The length of the space occupied by the three true molars is 0,041.

*Purchased, 1885.*

### Genus **DICHODON**, Owen<sup>1</sup>.

*Dentition*.—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ . The upper true molars are perfectly selenodont, with concave outer surfaces somewhat like *Hyopotamus*; the earlier premolars are elongated, and thereby approach *Xiphodon*. The limb-bones are unknown. The general form of the dentition is illustrated in the accompanying woodcut (fig. 19).

<sup>1</sup> Quart. Journ. Geol. Soc. vol. iv. p. 36 (1848).

Fig. 19.



*Dichodon cuspidatus*.—Dentition and left ramus of the mandible; from the Headon beds of Hordwell. 1. (From Owen's 'Paleontology'.)

**Dichodon cuspidatus**, Owen<sup>1</sup>.*Hab.* Europe<sup>2</sup>.

- 29716 b.** Two upper true molars; from the Headon beds (Upper Eocene) of Hordwell, Hampshire. These specimens agree with those figured by Owen in the Quart. Journ. Geol. Soc. vol. iv. pl. iv. fig. 3.

*Hastings Collection. Purchased, 1855.*

- M. 2185.** A left upper true molar, in a well-worn condition; from the Headon beds of Hordwell. *Purchased, 1885.*

- 29716 c.** A left upper true molar; from the Headon beds of Hordwell. *Hastings Collection. Purchased, 1855.*

- 30201.** The anterior portion of the cranium, showing the incisors, canine, and premolars, all in a worn condition; from the Headon beds of Hordwell. This specimen is described and figured by Owen in the Quart. Journ. Geol. Soc. vol. xiii. p. 192, pl. iii. fig. 4.

*Hastings Collection. Purchased, 1855.*

- 29717.** The hinder portion of the right ramus of the mandible, containing the third true molar, in an early condition of wear; from the Headon beds of Hordwell. This specimen is described and figured by Owen, *op. cit.* p. 193, fig. 5. (The figure is reversed.)

*Hastings Collection. Purchased, 1855.*

- 29716, 29716 a.** The left ramus of the mandible, in two fragments; from the Headon beds of Hordwell. This specimen shows pm. 4 and m. 3, in a much-worn condition, and the alveoli of the anterior teeth.

*Hastings Collection. Purchased, 1855.*

- 29716 c.** A detached lower premolar; from the Headon beds of Hordwell. *Hastings Collection. Purchased, 1855.*

- 29806.** A detached premolar; from the Headon beds of Hordwell. *Hastings Collection. Purchased, 1855.*

- 29728.** Fragment of the right premaxilla and maxilla, containing four teeth; from the Headon beds of Hordwell.

*Hastings Collection. Purchased, 1855.*

<sup>1</sup> Quart. Journ. Geol. Soc. vol. iv. p. 42 (1848).

<sup>2</sup> Rüttimeyer, *Natürliche Geschichte der Hirsche* (Abh. schw. pal. Ges. 1883, pt. 2, pl. vii. fig. 1), figures some upper teeth from Caylux, which he provisionally refers to the present species.

**Dichodon cervinus** (Owen<sup>1</sup>).

Syn. *Dichobunus cervinus*, Owen<sup>2</sup>.

*Hab.* England.

11955. Cast of the hinder portion of the left ramus of the mandible, containing the three true molars. The original, which is the type, is from the Upper Eocene of Binsted, Isle of Wight; and is described and figured, under the name of *Dichobunus*, by Owen in the 'British Fossil Mammals and Birds,' p. 44, fig. 181; and, under the name of *Dichodon*, by P. Gervais in the 'Zoologie et Paléontologie Françaises,' 2nd ed. p. 159, pl. xxxv. fig. 5. This specimen is preserved in the collection of the Geological Society.

*Purchased.*

29820. An upper molar of a small species, perhaps identical with the present; from the Headon beds (Upper Eocene) of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

Genus **CHÆROMERYX**, Pomel<sup>3</sup>.

Syn. *Sivameryx*, Lydekker<sup>4</sup>.

The identity of *Sivameryx* and *Chæromeryx* has been shown by the present writer in the Geol. Mag. dec. 3, vol. ii. pp. 72-73 (1885). The reference of the genus to the present family is provisional.

**Chæromeryx silistrensis** (Pentland<sup>5</sup>).

Syn. *Anthracotherium silistrense*, Pentland<sup>6</sup> (*in parte*).  
*Sivameryx sindiensis*, Lydekker<sup>7</sup>.

*Hab.* India.

19040. Fragment of the right maxilla, containing mm. 3 and mm. 4; (*Fig.*) from the Siwaliks of Káribári, Gáro Hills, N.E. Bengal, India. This is the type specimen, and is figured, under the name of *Anthracotherium*, by Pentland in the Trans. Geol. Soc. ser. 2, vol. ii. pl. xlv. figs. 2, 3, and by Falconer

<sup>1</sup> Trans. Geol. Soc. ser. 2, vol. vi. p. 45 (1841), *Dichobunus*.      <sup>2</sup> *Loc. cit.*

<sup>3</sup> Comptes Rendus, vol. xxvi. p. 687 (1848).

<sup>4</sup> Rec. Geol. Surv. Ind. vol. xi. p. 80 (1878).

<sup>5</sup> Trans. Geol. Soc. ser. 2, vol. ii. p. 394 (1828), *Anthracotherium*.

<sup>6</sup> *Loc. cit.*

<sup>7</sup> *Loc. cit.*



and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxviii. figs. 22, 22a. The fourth milk-molar, although of smaller size, very closely resembles the true molar from Sind figured, under the name of *Sivameryx sindiensis*, in the 'Palæontologia Indica,' ser. 10, vol. ii. pl. xxiii. fig. 11, and the two are probably specifically identical.

*Collected by Sir T. Colebrooke. Before 1828.*

- M. 2397.** Cast of the (?) third right upper true molar, provisionally referred to this species. The original is preserved in the Indian Museum, Calcutta, and was obtained from the Lower Siwaliks of Sind; it is figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. pl. xxiii. fig. 11, as *Sivameryx sindiensis*.

*Presented by R. Lydekker, Esq., 1885.*

#### GENUS *non det.*

- 27795.** Fragment of the left ramus of the mandible, containing  $\overline{\text{pm. 4}}$ , and the impression of the lateral surfaces of the three true molars; from the Lower Miocene of Sauvetat (Puy-de-Dôme), France. This specimen appears to indicate a form very close to *Dichodon*. Together with the next specimen, it is entered in the Museum Register as *Merycomenus*. *Croizet Collection. Purchased, 1848.*

- 27800.** Fragment of the mandible, containing  $\overline{\text{pm. 4}}$ ; from the Lower Miocene of Sauvetat.

*Croizet Collection. Purchased, 1848.*

### Family CÆNOTHERIIDÆ.

*Dentition*:—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ . There are usually five columns, or cusps, on the crowns of the upper true molars (which may be of a selenodont or a bunodont structure), two of which are placed on the anterior, and three on the posterior lobe; but in *Mouillactherium* the middle cusp on the posterior lobe of  $\overline{\text{m. 3}}$  is absent, and in the bunodont *Acotherium* it is wanting in all the three teeth of this series. It is probable that in all the genera the metapodials, and the navicular and cuboid were distinct. Rüttimeyer places the family between *Dichodon* and *Xiphodon*.

Genus **CÆNOTHERIUM**, Bravard<sup>1</sup>.Syn. *Oplotherium*, Laizer and Parieu<sup>2</sup>.*Microtherium*, H. v. Meyer<sup>3</sup>.*Zooligus*, Aymard<sup>4</sup>.*Plesiomeryx*, P. Gervais<sup>5</sup>.

In the typical forms there is no diastema in the dental series, although a distinct one exists in certain forms to which the name *Plesiomeryx* was applied. Filhol has, however, shown, in the Ann. Sci. Géol. vol. xii. art. 3, pp. 77-84, that there is such a gradual transition in this respect from one type to the other that no generic distinction can be drawn between *Cænotherium* and *Plesiomeryx*; the diastema being present in one race of *Cænotherium gracile* and absent in another. There are four distinct metapodials, and the navicular and cuboid elements of the tarsus are doubtless separate.

**Cænotherium commune**, Bravard<sup>6</sup>.Syn. *Oplotherium leptognathum*, Laizer and Parieu<sup>7</sup>.*Cænotherium leptognathum*, Pomel<sup>8</sup>.*Cænotherium elegans*, Pomel<sup>9</sup>.*Microtherium renggeri*, H. v. Meyer<sup>10</sup>.

This species is of medium size, and has no diastema in the type form. It is recorded by Filhol from Cournon and the Quercy phosphorites; the specimen described by him from the latter deposits being named var. *procommune*.

*Hab.* Europe.

**34964.** Slab containing a number of skulls, jaws, and limb-bones; (*Fig.*) from the Lower Miocene of Cournon (Puy-de-Dôme), France. This specimen is figured by De Blainville in his 'Ostéographie,' Genus *Anoplotherium*, pl. vii. The length of the series of upper cheek-teeth is 0,0285 in one, and 0,029 in another specimen. The length of the space occupied by the seven lower cheek-teeth is 0,029; the length of the femur 0,059; and that of the tibia 0,070.

*Bravard Collection. Purchased, 1852.*<sup>1</sup> Monogr. d. Genre Cainotherium (1835), *Cainotherium*.<sup>2</sup> Ann. Sci. Nat. sér. 2, vol. x. p. 335 (1838).<sup>3</sup> Neues Jahrb. 1837, p. 557.<sup>4</sup> In Pictet's 'Paléontologie,' 2nd ed. vol. i. p. 340 (1853).<sup>5</sup> Journ. Zool. vol. ii. p. 369 (1873).<sup>6</sup> *Loc. cit.*<sup>7</sup> *Loc. cit.*<sup>8</sup> Catalogue Méthodique, p. 96 (1853).<sup>9</sup> *Ibid.* p. 95.<sup>10</sup> Neues Jahrb. 1837, p. 557.

- 34965.** A slab containing several skulls, jaws, and limb-bones ; from the Lower Miocene of Cournon.  
*Bravard Collection. Purchased, 1852.*
- 27763** The cranium, in a somewhat crushed condition, together with the atlas, and some of the limb-bones ; from the Lower Miocene of Cournon.  
*Croizet Collection. Purchased, 1848.*
- 27763 a.** The cranium, in a much-crushed condition ; from the Lower Miocene of Cournon.  
*Croizet Collection. Purchased, 1848.*
- 27763 b.** Part of the cranium, in a much-crushed condition ; from the Lower Miocene of Cournon.  
*Croizet Collection. Purchased, 1848.*
- 27763 c.** The palatal portion of the cranium ; from the Lower Miocene of Cournon. *Croizet Collection. Purchased, 1848.*
- 27763 d.** The palate ; from the Lower Miocene of Cournon.  
*Croizet Collection. Purchased, 1848.*
- 27763 e.** The cranium, left ramus of the mandible, distal extremity of the humerus, and the ulna ; from the Lower Miocene of Cournon. *Croizet Collection. Purchased, 1848.*
- 27695.** The nearly complete mandible, and a portion of the premaxillæ ; from the Lower Miocene of Cournon.  
*Croizet Collection. Purchased, 1848.*
- 35818.** The right maxilla of an immature individual, showing the milk- and permanent cheek-teeth ; from the Lower Miocene of Haslach, near Ulm, Württemberg. This and the next specimen belong to Meyer's *M. renggeri*. *Purchased, 1860.*
- 35819.** Fragment of the left ramus of the mandible of an immature individual ; from the Lower Miocene of Haslach.  
*Purchased, 1860.*
- M. 1410.** Four specimens of the hinder portion of mandibular rami ; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. These specimens agree precisely with the mandibles in Nos. 34964-5. *Purchased, 1884.*
- M. 1402.** Four imperfect rami of the mandible ; from the Upper Eocene of Caylux. *Purchased, 1884.*

- M. 1402 a.** Two specimens of the hinder portion of the right ramus of the mandible; from the Upper Eocene of Caylux. These specimens agree very closely with the jaw figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xii. figs. 269–70, under the name of var. *procommune*.

*Purchased, 1884.*

- M. 1410 a.** The hinder part of the left ramus of the mandible, resembling the last; from the Upper Eocene of Caylux.

*Purchased, 1884.*

### **Cænotherium, sp.**

This form is not unlike *C. commune*, with the exception that there is a diastema between the canine and pm. 1, and another between pm. 1 and pm. 2. The instance of the two varieties of *C. gracile* noticed above indicates, however, the need of caution in founding new species merely on the presence or absence of a diastema. Under these circumstances it appears desirable to await additional specimens before deciding whether the present ones should be regarded as a new species, or merely as a well-marked variety. The name *bravardi*, either as a specific or a varietal one, may eventually be appropriately applied to this form.

*Hab. France.*

- M. 1401.** The anterior portion of the cranium; from the Upper (Fig.) Eocene of Caylux (Tarn-et-Garonne), France. This specimen, which is represented in the accompanying woodcut (fig. 20), has been described and figured by the

Fig. 20.



*Cænotherium, sp.*—The palatal portion of the cranium; from the Upper Eocene of Caylux.  $\frac{1}{4}$ .

present writer in the *Geol. Mag.* dec. 3, vol. ii. pp. 67–68 (1885); its dimensions are as follows, viz. :—

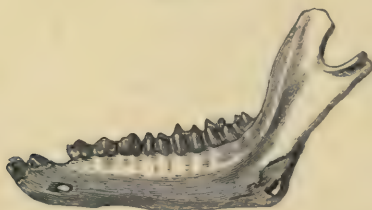


Length of series of cheek-teeth . . . .	0·028
"          "      true molars ..	0·013
Greatest width of nasals (anteriorly)	0·0052
Vertical diameter of orbit . . . . .	0·0125
Length of diastema . . . . .	0·002

*Purchased, 1884.*

**M. 1401 a.** The left ramus of the mandible ; from the Upper Eocene (*Fig.*) of Caylux. This specimen is figured in the woodcut

Fig. 21.



*Cænotherium*, sp.—The left ramus of the mandible, imperfect posteriorly; from the Upper Eocene of Caylux. †.

(fig. 21), and has been described and figured by the writer in the passage cited; its dimensions are as follows:—

Extreme length . . . . .	0·044
,, height . . . . .	0·027
Length of dental series . . . . .	0·033
,, last six teeth . . . . .	0·0248
Height at pm. 2 . . . . .	0·0065
,, m. 3 . . . . .	0·083
Length of diastema . . . . .	0·0021

*Purchased, 1884.*

**M. 1401 b.** A lumbar vertebra, associated with the cranium No. M. 1401. *Purchased, 1884.*

### ***Cænotherium laticurvatum* (Geoffroy <sup>1</sup>).**

Syn. *Anoplotherium laticurvatum*, Geoffroy <sup>2</sup>.

*Cænotherium laticurvatum*, Pomel <sup>3</sup>.

*Cænotherium metopias*, Pomel <sup>4</sup>.

<sup>1</sup> *Revue Encyclopédique*, 1852 (*teste* P. Gervais), *Anoplotherium*.

<sup>2</sup> *Loc. cit.*      <sup>3</sup> *Catalogue Méthodique*, p. 94 (1853).      <sup>4</sup> *Loc. cit.*

This species is the largest of the genus ; there is no diastema ; the nasals are long and terminate in a notch ; and there is a depression at their junction with the frontals.

*Hab.* Europe.

- 29243.** The cranium, wanting the hinder part of the brain-case ; from the Lower Miocene of Allier, France. This specimen agrees very closely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. x. pl. xxix. fig. 3. The length of the space occupied by the seven cheek-teeth is 0,035.

*Bravard Collection. Purchased, 1852.*

- 29244.** The cranium, nearly perfect ; from the Lower Miocene of Allier. This specimen is rather smaller than the last, and probably belongs to a female. The length of the space occupied by the seven cheek-teeth is 0,0345.

*Bravard Collection. Purchased, 1852.*

- 29245.** The cranium, imperfect on the right side posteriorly ; from the Lower Miocene of Allier. This specimen agrees very closely with No. 29243.

*Bravard Collection. Purchased, 1852.*

- M. 2163.** Anterior portion of the cranium, showing the greater part of the cheek-dentition ; from the Lower Miocene of St. Gérard-le-Puy (Allier). *Purchased, 1885.*

- 29247.** The palate, wanting the incisors and canines ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- 29238.** Fragment of the left maxilla, containing the last four cheek-teeth ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- 29242.** Fragment of the left maxilla, containing pm. 4, m. 1, and m. 2 ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- 29239.** The right half of the palate, containing the seven cheek-teeth, in a well-worn condition ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- 29154.** Fragment of the left maxilla, containing the milk-molars and m. 1 ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- 29246.** Cast of the brain-cavity and middle portion of the cranium; from the Lower Miocene of Allier.  
*Bravard Collection. Purchased, 1852.*
- 29248.** The broken hinder portion of the cranium; from the Lower Miocene of Allier. *Bravard Collection. Purchased, 1852.*
- 26667.** The occipital portion of the cranium; from the Lower Miocene of Allier. *Pomel Collection. Purchased, 1851.*
- 27595.** Fragment of the right maxilla, containing the seven cheek-teeth, and the associated right ramus of the mandible (imperfect posteriorly); from the Lower Miocene of Chapturat (Puy-de-Dôme), France. The teeth are in a well-worn condition; the two series were originally in contact, but have been separated for better examination.  
*Croizet Collection. Purchased, 1848.*
- 26691.** The nearly complete left ramus of the mandible, wanting the teeth in front of  $\overline{\text{pm. 4}}$ ; from the Lower Miocene of Allier. This specimen agrees precisely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. i. fig. 7. *Pomel Collection. Purchased, 1851.*
- 29223.** The greater portion of the right ramus of the mandible, wanting the teeth in front of  $\overline{\text{pm. 2}}$ ; from the Lower Miocene of Allier. *Bravard Collection. Purchased, 1852.*
- 29139.** The greater portion of the left ramus of the mandible, containing the last five cheek-teeth; from the Lower Miocene of Allier. *Bravard Collection. Purchased, 1852.*
- 29218.** The greater portion of the left ramus of the mandible, containing the last five teeth, in a well-worn condition; from the Lower Miocene of Allier.  
*Bravard Collection. Purchased, 1852.*
- 29146.** Part of the right ramus of the mandible, containing the last five cheek-teeth, in a much-worn condition; from the Lower Miocene of Allier.  
*Bravard Collection. Purchased, 1852.*
- 29139.** The hinder part of the left ramus of the mandible, containing the last five teeth; from the Lower Miocene of Allier.  
*Bravard Collection. Purchased, 1852.*

29171. The greater part of the left ramus of the mandible, containing the last five teeth, in a much-worn condition; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852*

26690. The nearly complete right ramus of the mandible, wanting the teeth in front of  $\overline{\text{pm. 2}}$ ; from the Lower Miocene of Allier.

*Pomel Collection. Purchased, 1851.*

29220. The nearly complete left ramus of the mandible, wanting the incisors, canine,  $\overline{\text{pm. 1}}$ , and  $\overline{\text{pm. 3}}$ ; from the Lower Miocene of Allier. The true molars occupy a rather smaller space than in No. 26691.

*Bravard Collection. Purchased, 1852.*

29150. The greater portion of the right ramus of the mandible, containing the last six teeth; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

29145. The right ramus of the mandible, containing the three true molars, and  $\overline{\text{pm. 4}}$  in alveolo; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

29052. The left ramus of the mandible, containing the three true molars; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

29107. Part of the right ramus of the mandible, containing the last six teeth; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

29111. The greater part of the right ramus of the mandible, containing the last four cheek-teeth; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

29072. Part of the right ramus of the mandible, containing the last four cheek-teeth; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

29147. The right ramus of the mandible of a young individual, containing  $\overline{\text{mm. 4}}$ ,  $\overline{\text{m. 1}}$ , and  $\overline{\text{m. 2}}$ ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

29084. The right ramus of the mandible, containing the last five teeth; from the Lower Miocene of Allier. The length of the space occupied by the three true molars is 0.016.

*Bravard Collection. Purchased, 1852.*

29108. Part of the left ramus of the mandible, containing the last



five teeth, the space occupied by which measures 0,0275 ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- 30493.** Hinder portion of the right ramus of a mandible apparently belonging to this species ; from the Lower Miocene of Weissenau, near Mayence, Hesse-Darmstadt.

*Hastings Collection. Purchased, 1855.*

***Cænotherium geoffroyi*, Pomel<sup>1</sup>.**

This species is smaller than *C. commune*, but, like that species, has no diastema. It is recorded by Pomel from Cournon, and by Filhol from St. Gérard-le-Puy ; and it appears probable that the specimens noticed below from Caylux belong to the same species.

*Hab.* France.

- 29084 a.** Part of the left ramus of the mandible, containing the last six teeth ; from the Lower Miocene of Allier, France. This specimen agrees precisely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. i. fig. 12.

*Bravard Collection. Purchased, 1852.*

- 29084 b.** Fragment of the right ramus of the mandible, containing the last four teeth ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- 29084 c.** Fragment of the left ramus of the mandible, containing the last four teeth ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- 29084 d.** Several limb-bones ; from the Lower Miocene of Allier.

*Bravard Collection. Purchased, 1852.*

- M. 1402.** Greater portion of the left ramus of the mandible, containing the three true molars, and the alveoli of the anterior teeth ; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. There is no diastema ; and the specimen agrees precisely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. xi. pl. i. fig. 12.

*Purchased, 1884.*

- M. 1402 a.** Four imperfect rami of the mandible, agreeing with the last specimen ; from the Upper Eocene of Caylux.

*Purchased, 1884.*

- M. 1404.** Two imperfect rami of the mandible ; from the Upper Eocene of Caylux.

*Purchased, 1884.*

<sup>1</sup> Catalogue Méthodique, p. 96 (1853).

- M. 1410 c.** Fragment of the right maxilla, containing the last five cheek-teeth, not improbably belonging to the present species; from the Upper Eocene of Caylux. The length of the space occupied by the five teeth is 0,019.

*Purchased, 1884.*

***Cænotherium cadurcense* (P. Gervais<sup>1</sup>).**

Syn. *Plesiomeryx cadurcensis*, P. Gervais<sup>2</sup>.

This species is smaller than *C. commune*; and has a distinct diastema in both jaws, occurring between the first and second premolars.

*Hab.* France.

- M. 1988 d.** The nearly complete cranium, showing all the dentition; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. The length of the space occupied by the last six cheek-teeth in this specimen measures 0,0175, which agrees very closely with the dimensions of the specimen figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xii. fig. 271.

*Purchased, 1884.*

- M. 1404 a, M. 1789, M. 1791.** Four rami of the mandible; from the Upper Eocene of Caylux. The length of the space occupied by the last six teeth is 0,020; which is somewhat less than in a specimen described by Filhol in the *Ann. Sci. Géol.* vol. viii. art. 1, p. 207 (0,0215). This may indicate that *C. gracile*, Pomel, from St. Gérard-le-Puy, which is only distinguished from *C. cadurcense* by its inferior size, may really be only a small race of this species.

*Purchased, 1884.*

- M. 1402 b.** The left ramus of the mandible; from the Upper Eocene of Caylux.

*Purchased, 1884.*

***Cænotherium quinquedentatum* (Filhol<sup>3</sup>).**

Syn. *Plesiomeryx quinquedentata*, Filhol<sup>4</sup>.

This is a very small species, known only by the mandible. There is a diastema between pm. 2 and pm. 3.

*Hab.* France.

<sup>1</sup> Journ. Zool. vol. ii. p. 369 (1873), *Plesiomeryx*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> *Ann. Sci. Géol.* vol. viii. art. 1, p. 210 (1877), *Plesiomeryx*.

<sup>4</sup> *Loc. cit.*

**M. 1404 b.** Six rami of the mandible; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. These specimens agree with the type mandible figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xix. figs. 314-316. The length of the space occupied by the last five teeth is 0,019.

*Purchased, 1884.*

***Cænotherium filholi*, Lydekker<sup>1</sup>.**

This species is about the size of *C. laticurvatum*, but has a shorter series of cheek-teeth. It is distinguished by the presence of a diastema occurring between the canine and the first premolar in the upper, and between the first and second premolars in the lower jaw; by the absence of frontal sulci; and above all by the peculiar form of the nasals, which are short, oval, and sharply pointed anteriorly. These differ from those of any other described species, in all of which

Fig. 22.



*Cænotherium filholi*.—Upper and lower views of the cranium; from the Upper Eocene of Caylux. †.

<sup>1</sup> *Geol. Mag.* dec. 3, vol. ii. p. 64 (1885).

these bones are long, narrow, and terminate anteriorly in a deep notch. There is no depression on the frontals at the root of the nasals.

*Hab.* France.

**M. 1399.** The cranium of a male, wanting only a portion of the right zygomatic arch, part of the posterior border of the left orbit, the right outer incisor and canine, and the left inner incisor and the first premolar; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen, which is figured in the accompanying woodcut (fig. 22), is the type of the species, and is described and figured by the present writer in the *Geol. Mag. loc. cit.* In the following table the dimensions of this and the next specimen are compared with those of a typical skull of *C. laticurvatum*.

	<i>C. filholi.</i>		<i>C. laticurvatum.</i>
	M. 1399.	M. 1400.	
<i>Cranium:—</i>			
Extreme length superiorly . . . . .	0·081	0·073	0·0815
„ inferiorly . . . . .	0·067	0·064	0·070
Length of series of cheek-teeth . . . . .	0·032	0·031	0·037
„ true molars . . . . .	0·0144	0·0143	0·0175
Width of palate at m. 3 . . . . .	0·014	....	0·015
Length of nasals . . . . .	0·019	0·0175	0·024
Greatest width of do. . . . .	0·008	0·0075	0·006
Height of occiput . . . . .	0·015	....	0·016
Extreme height of cranium . . . . .	0·033	....	0·033
Vertical diameter of orbit . . . . .	0·014	0·013	0·015
Length of diastema . . . . .	0·0037	0·003	
<i>Mandible:—</i>			
Extreme length . . . . .		0·056	0·067
„ height . . . . .		0·037	0·043
Length of dental series . . . . .		0·039	0·042
„ last six teeth . . . . .		0·030	0·034
Height at pm. 2 . . . . .		0·007	0·005
„ m. 3 . . . . .		0·013	0·017
Length of diastema . . . . .		0·0026	

*Purchased, 1884.*

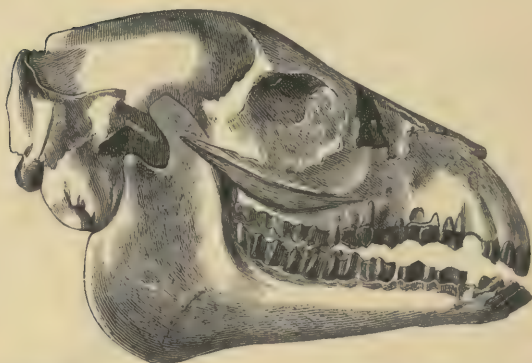
**M. 1400.** The cranium and mandible of a smaller, and probably female, individual; from the Upper Eocene of Caylux. This specimen, which is figured in the accompanying wood-



cut (fig. 23), is described and figured by the present writer in the *Geol. Mag. loc. cit.* The cranium is somewhat crushed; but exhibits the complete dentition of both sides. Its dimensions are given under the head of the last specimen.

*Purchased, 1884.*

Fig. 23.



*Cænotherium filholi*.—The right lateral aspect of the cranium and mandible; from the Upper Eocene of Caylux. †.

**M. 1401 b.** The hinder portion of the cranium; from the Upper Eocene of Caylux. *Purchased, 1884.*

**M. 1410.** Palatal portion of the cranium, agreeing in size with No. M. 1399; from the Upper Eocene of Caylux.

*Purchased, 1884.*

**M. 1790** Three fragments of the mandible, agreeing in size with No. M. 1400; from the Upper Eocene of Caylux.

*Purchased, 1884.*

**M. 1403.** Fragment of the right ramus of the mandible, containing the last three milk-molars, and  $\overline{m. 1}$  and  $\overline{m. 2}$ ; from the Upper Eocene of Caylux.

*Purchased, 1884.*

**M. 1403 a.** Anterior portion of the right ramus of the mandible, containing the alveoli of the incisors, canine, and  $\overline{pm. 1}$ , and the other cheek-teeth, except  $\overline{m. 3}$ , in a perfect condition; from the Upper Eocene of Caylux. This specimen is larger than the mandible of No. M. 1400, and agrees exactly in size with the cranium No. 1399. The length of the space occupied by the last three premolars and the first two molars is 0,0349.

*Purchased, 1884.*

*Limb-bones of Cænotherium.*

Owing to the number of species it is generally impossible to refer limb-bones to their respective owners. It is, however, probable that the larger specimens from Allier belong to *C. laticurvatum*, and from Caylux to *C. filholi*<sup>1</sup>. The following specimens from the Lower Miocene of Allier belong to the Pomel and Bravard Collections (*Purchased*, 1851 and 1852); those from the Upper Eocene of Caylux were purchased in 1884.

29419. The glenoidal end of a scapula ; from Allier.

29267-9, 29271, 29279, 29284, 29290, 29341-2-4, 35084-6.  
Numerous humeri ; from Allier.

M. 1407-1412. Four humeri ; from Allier.

26676, 35358-9. Five ulnæ ; from Allier.

29360-1. Two radii ; from Allier.

M. 1408. Four radii ; from Caylux.

26678, 29293, 35062-4. Six innominates ; from Allier.

M. 1405. Four femora ; from Caylux.

M. 1412. Nine femora ; from Caylux.

29253-4, 29258. Three tibiæ ; from Allier.

M. 1406, 1412 a. Sixteen tibiæ ; from Caylux.

M. 1497. Two calcanea ; from Caylux.

M. 1409. An astragalus ; from Caylux.

M. 1411. Numerous metapodial bones ; from Caylux.

Genus **DICHOBUNUS**, Cuvier<sup>2</sup>.

Syn. *Didymodon*, Blake<sup>3</sup>.

Rütimeyer regards this genus as a bunodont form closely allied to *Cænotherium*, and this view is followed here. Filhol<sup>4</sup> has described two allied genera under the name of *Deilotherium* and *Spaniotherium*.

<sup>1</sup> In the case of some of the larger specimens, the generic determination must be considered as provisional.

<sup>2</sup> Ossements Fossiles, ed. 2, vol. iii. p. 70 (1822), *Dichobune*.

<sup>3</sup> Geologist, vol. vi. p. 8 (1863).

<sup>4</sup> Ann. Soc. Sci. Phys. Nat. Toulouse, 1882, pp. 112, 113.

**Dichobunus leporinus, Cuvier<sup>1</sup>.**Syn. *Anoplotherium minus*, Cuvier<sup>2</sup>.*Didymodon vauchusianus*, Blake<sup>3</sup>.*Hab.* France.

- M. 1418.** Fragment of the right maxilla, containing the three true molars, in an early condition of wear; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. The length of the space occupied by the three teeth is 0.020.

*Purchased*, 1884.

- M. 1418 a.** Cast of a portion of the left maxilla, containing the last three premolars and the first two true molars. The original is probably from the Upper Eocene of Montmartre, near Paris. This specimen is precisely similar to the corresponding part of the larger cranium figured by De Blainville in his 'Ostéographie,' genus *Anoplotherium*, pl. vi.

*No history.*

- M. 2160.** Cast of the left maxilla, showing mm. 3, mm. 4, and m. 1. The locality of the original is unknown.

*Purchased*, 1885.

- M. 1499.** Fragment of the left ramus of the mandible, containing the second and third true molars; from the Upper Eocene of Caylux. This specimen agrees precisely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xix. fig. 327.

*Purchased*, 1884.

- M. 1500.** Fragment of the left ramus of the mandible, containing pm. 2, the alveolus of pm. 3, pm. 4, m. 1, and m. 2, in a partially worn condition; from the Upper Eocene of Caylux. Allowing for the difference in wear of the two specimens, this jaw agrees very closely with the one figured by Filhol, *loc. cit.*

*Purchased*, 1884.

- 30673.** Fragment of the left ramus of the mandible, containing (*Fig.*) mm. 4 (broken), m. 1, and m. 2; from the Upper Eocene of Débruge near Apt (Vaucluse), France. This specimen is described and figured by Blake in the 'Geologist,' vol. vi. p. 8, pl. ii. figs. 1, 2 (1863), under the name of *Didy-*

<sup>1</sup> *Ossemens Fossiles*, ed. 2, vol. iii. p. 70 (1822).<sup>2</sup> *Ann. d. Muséum*, vol. iii. p. 381 (1804).<sup>3</sup> *Geologist*, vol. vi. p. 8 (1863).

*modon vauchusianus*, of which it is the type; he considered the three teeth as the three true molars.

*Bravard Collection. Purchased, 1852.*

- M. 2160.** Three fragments of the mandible, two of which show the last milk-molar; from the Upper Eocene of Caylux.

*Purchased, 1885.*

- M. 2162.** Cast of the right ramus of the mandible, showing the third incisor, canine, and all the cheek-teeth. The locality of the original is not known.

*Purchased, 1885.*

- 29513.** The scapula; from the Upper Eocene of Montmartre.

*Hastings Collection. Purchased, 1855.*

- 29491.** The anconeal joint; from the Upper Eocene of Montmartre. This specimen agrees with the specimens figured by De Blainville, *loc. cit.* *Hastings Collection. Purchased, 1855.*

- 29473.** Two specimens of the calcaneum; from the Upper Eocene of Montmartre. These specimens are rather larger than those figured by De Blainville.

*Hastings Collection. Purchased, 1855.*

### **Dichobunus robertianus**, P. Gervais<sup>1</sup>.

This is a smaller species than the last.

*Hab.* France.

- 44880 e.** Part of the right ramus of the mandible, showing the three true molars; from the Upper Eocene of Montmartre. This specimen agrees very closely with the mandible of *D. robertianus* from the same locality figured by Gervais in the *Zool. et Pal. Françaises*, 2nd ed. pl. xxxv. fig. 13; and may, at least provisionally, be referred to the same species. The length of the space occupied by the three true molars is 0,0205, as against 0,0245 in *D. leporinus* (No. M. 2165). *Hastings Collection. Purchased, 1855.*

### Genus **ACOTHERULUM**, P. Gervais<sup>2</sup>.

The general form of the skull and teeth of the one known species of this genus seems to indicate affinity with *Dichobunus*, but the absence of the intermediate cusp on the hinder lobe of the upper true molars, and the more completely bunodont structure of these teeth apparently indicates affinity with *Cebochaerus* and its allies.

<sup>1</sup> *Zool. et Pal. Françaises*, 1st ed. vol. ii. Exp. no. 35, p. 6 (1848-52).

<sup>2</sup> *Comptes Rendus*, vol. **xxx**. p. 604 (1850).



**Acotherulum saturninum**, P. Gervais<sup>1</sup>.*Hab.* Europe.

**36942, 36964.** Numerous upper and lower teeth; from the Bembridge (?) beds (Upper Eocene) of the Isle of Wight. These teeth appear to agree precisely with those of typical continental specimens. *Hastings Collection. Purchased, 1855.*

**37333.** An upper and part of a lower true molar; from the Upper Eocene of Bembridge, Isle of Wight.

*Presented by F. E. Edwards, Esq., 1863.*

**36964 a.** Cast of part of the maxilla of an immature individual, showing mm. 3, mm. 4, m. 1, and m. 2. The original is from the Upper Eocene of Vaucluse, France.

*Presented by Dr. Kowalevsky.*

**36964 b.** Fragment of the right maxilla of an immature individual, containing mm. 3 and mm. 4; from the Headon beds (Upper Eocene) of Hordwell, Hampshire.

*Hastings Collection. Purchased, 1855.*

## Family ANOPLOTHERIIDÆ.

*Dentition*:—(Usually) I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ . In *Anoplotherium minus* (Filhol) pm. 1 is absent.

The dentition is imperfectly selenodont, and there are five columns on the crowns of the upper true molars; three placed on the anterior and two on the posterior lobe. In this and all the subsequent families, the metapodials and the navicular and cuboid of the tarsus are distinct.

Genus **XIPHODON**, Cuvier<sup>2</sup>.

Including *Xiphodontherium*, Filhol<sup>3</sup>.

In the typical forms there is no diastema, but in certain small species about the size of *Cænotherium* referred by Filhol to a distinct genus under the name of *Xiphodontherium*, but which the writer thinks may better be included in the type genus, there is a well-marked interval in the dental series. The true molars are formed after the type of those of *Anoplotherium*, but present a more com-

<sup>1</sup> Comptes Rendus, vol. xxx. p. 604 (1850).

<sup>2</sup> Ossements Fossiles, 2nd ed. vol. iii. p. 62 (1822).

<sup>3</sup> Ann. Sci. Géol. vol. viii. art. 1, p. 200 (1877).

pletely selenodont structure. According to P. Gervais, the feet are didactylate. Flower arranges this genus and *Cænotherium* in one family—the *Xiphodontidæ*.

***Xiphodon gracilis*, Cuvier<sup>1</sup>.**

Syn. *Anoplotherium (Xiphodon) gracile*, Cuvier<sup>2</sup>.

*Hab.* Europe.

30641. Fragment of the right maxilla, containing the last four cheek-teeth; from the Upper Eocene of Débruge, near Apt (Vaucluse), France.

*Bravard Collection. Purchased, 1852.*

30640. Fragment of the right maxilla, containing pm. 4, m. 1, and m. 2; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- M. 2145. Fragment of the right maxilla, containing the four last cheek-teeth; from the Upper Eocene of Débruge.

*Purchased, 1885.*

- M. 2146-7. Fragments of the right and left maxillæ of young individuals, showing mm. 3 mm. 4, and m. 1; from the Upper Eocene of Débruge.

*Purchased, 1885.*

30639. Fragment of the left maxilla, containing pm. 3, pm. 4, and m. 1; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

30642. Fragment of the right maxilla, containing m. 1 and m. 2; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

30643. Fragment of the left maxilla, containing m. 1 and m. 2; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

30644. The penultimate left upper true premolar; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

30645. Detached upper true molars; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

30634. The greater portion of the right ramus of the mandible, containing the last five cheek-teeth; from the Upper

<sup>1</sup> Ossements Fossiles, ed. 2, vol. iii. p. 70 (1822).

<sup>2</sup> *Loc. cit.*

Eocene of Débruge. This specimen agrees precisely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. x. figs. 251-3.

*Bravard Collection. Purchased, 1852.*

- 30663.** The greater portion of the left ramus of the mandible, containing the last four cheek-teeth, in an early stage of wear; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- 30646.** Fragment of the left ramus of the mandible, containing the last four cheek-teeth, in a well-worn condition; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- M. 2148.** The greater part of the right ramus of the mandible, with the last five cheek-teeth; from the Upper Eocene of Débruge.

*Purchased, 1885.*

- M. 2149.** The greater portion of the left ramus of the mandible, showing all the cheek-teeth except  $\overline{\text{pm. 1}}$ ; from the Upper Eocene of Débruge.

*Purchased, 1885.*

- 30635.** Fragment of the left ramus of the mandible, containing the three true molars; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- 30638.** Fragment of the right ramus of the mandible, containing the three true molars, in a much-worn condition; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- 30653.** Fragment of the right ramus of the mandible, containing the three true molars; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- 26797.** Fragment of the right ramus of the mandible, containing the four last cheek-teeth; from the Upper Eocene of Débruge.

*Pomel Collection. Purchased, 1851.*

- 30636.** Fragment of the left ramus of the mandible, containing the three true molars, the third broken; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- 30637.** Fragment of the right ramus of the mandible, containing the three true molars; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

30649. Fragment of the right ramus of the mandible, containing  $\overline{\text{pm. 4}}$  and  $\overline{\text{m. 1}}$ ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
30654. Fragment of the left ramus of the mandible, containing  $\overline{\text{m. 1}}$  and  $\overline{\text{m. 2}}$ ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
30650. Fragment of the right ramus of the mandible, containing  $\overline{\text{m. 1}}$  and  $\overline{\text{m. 2}}$ , in a much-worn condition; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
30662. The symphyseal portion of the right ramus of the mandible; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
30647. Fragment of the right ramus of the mandible, containing  $\overline{\text{pm. 3}}$ ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
26798. Fragment of the right ramus of the mandible, containing  $\overline{\text{pm. 3}}$ ; from the Upper Eocene of Débruge.  
*Pomel Collection. Purchased, 1851.*
36948. The third lower premolar; from the Upper Eocene of Bembridge, Isle of Wight. This is the only English example with which the writer is acquainted. *Purchased, 1861.*
26799. The distal half of the right humerus; from the Upper Eocene of Vaucluse.  
*Pomel Collection. Purchased, 1851.*
- 26799 a. The distal portion of the left humerus; from the Upper Eocene of Montmartre, near Paris. *No history.*
- a 62 (O. C.). Cast of the heads of the bones forming the left anconeal joint. The original is from the Upper Eocene of Montmartre. *No history.*
26801. The distal half of the right tibia; from the Upper Eocene of Vaucluse.  
*Pomel Collection. Purchased, 1851.*
26805. The right calcaneum; from the Upper Eocene of Vaucluse.  
*Pomel Collection. Purchased, 1851.*
29472. The right calcaneum; from the Upper Eocene of Montmartre.  
*Hastings Collection. Purchased, 1855.*
- a 60 (O. C.). Cast of the right astragalus. The original is from the Upper Eocene of Montmartre. *No history.*



26802. The astragalus; from the Upper Eocene of Vacluse.  
*Pomel Collection. Purchased, 1851.*
26803. The navicular; from the Upper Eocene of Vacluse.  
*Pomel Collection. Purchased, 1851.*
26804. The cuboid; from the Upper Eocene of Vacluse.  
*Pomel Collection. Purchased, 1851.*
- (See also ADDENDA.)

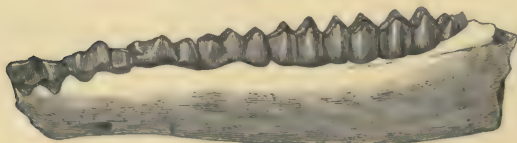
***Xiphodon gelyensis*, P. Gervais<sup>1</sup>.**

This species has been hitherto known only by the imperfect ramus of the mandible figured by P. Gervais, *loc. cit.* 2nd ed. pl. xv. fig. 4, which was obtained from the Upper Eocene of St. Gely-du-Fesc, near Montpellier (Hérault), France. The specimen noticed below agrees so closely with the type, that it may be at least provisionally referred to the same species.

*Hab.* France.

- M. 1419.** The left ramus of the mandible, containing all the cheek-teeth (the last milk-molar being still in position); from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen, which is represented in the accompanying woodcut (fig. 24), from the very elongated form of the

Fig. 24.



*Xiphodon gelyensis*?—The left ramus of the mandible; from the Upper Eocene of Caylux. †.

premolars and the apparent absence of a diastema, seems to belong to a true *Xiphodon*, and is of much smaller size than *X. gracilis*. The three true molars agree almost exactly with those of the type of *X. gelyensis*; but the last milk-molar is rather longer than pm. 4. The length of the space occupied by the seven cheek-teeth is 0,061, and that by the three true molars 0,025; the latter dimension in the type specimen being 0,0265. The teeth are very like those of *X. gracilis*. *Purchased, 1884.*

<sup>1</sup> Zool. et Pal. Françaises, 1st ed. vol. i. p. 90 (1848–52).

**Xiphodon secundarius** (Filhol<sup>1</sup>).

Syn. *Xiphodontherium secundarium*, Filhol<sup>2</sup>.

Hab. France.

**M. 2137.** Part of the right ramus of the mandible, containing the last five cheek-teeth; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen agrees precisely with the one figured by Filhol in the Ann. Sci. Géol. vol. viii. pl. xix. figs. 321-3. *Purchased*, 1885.

**M. 2138.** The greater part of the left ramus of the mandible, containing the last four cheek-teeth and the alveoli of the earlier teeth; from the Upper Eocene of Caylux. *Purchased*, 1885.

Genus **DACRYTHERIUM**, Filhol<sup>3</sup>.

The molars of this genus are nearest to those of *Xiphodon*, but the premolars are less elongated; there is no diastema.

**Dacrytherium ovinum** (Owen<sup>4</sup>).

Syn. *Dichobunus ovinus*, Owen<sup>5</sup>.

There seems no reasonable doubt but that the so-called *Dichobunus ovinus*, which P. Gervais<sup>6</sup> considered closely allied to *Xiphodon gracilis*, belongs to *Dacrytherium*. It is a rather larger form than *D. cayluxense*, Filhol<sup>7</sup>; and it is not improbable that it may be specifically the same as *Xiphodon platyceps*, Flower<sup>8</sup>, the cranium of which is very like that of *D. cayluxense*, but of somewhat larger size.

**29174 a.** The nearly complete mandible, showing all the teeth with (Fig.) the exception of the two inner pairs of incisors; from the Headon beds (Upper Eocene) of the Isle of Wight. This specimen is the type of the species, and is described and figured by Owen in the Quart. Journ. Geol. Soc. vol. xiii. p. 254, pl. viii. The length of the space occupied by the last six teeth is 0,066, as against 0,062 in *D. cayluxense*.

<sup>1</sup> Ann. Sci. Géol. vol. viii. art. 1, p. 203 (1877), *Xiphodontherium*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Comptes Rendus, vol. lxxxii. p. 288 (1876).

<sup>4</sup> Quart. Journ. Geol. Soc. vol. xiii. p. 254 (1857), *Dichobunus*.

<sup>5</sup> *Loc. cit.*

<sup>6</sup> Zool. et Pal. Françaises, 2nd ed. p. 159.

<sup>7</sup> Ann. Sci. Géol. vol. viii. pl. xviii. pl. x. figs. 254-6. Amended.

<sup>8</sup> Proc. Zool. Soc. 1876, p. 3, pl. i.

The canine is ~~developed in the mandible~~ 'Ossemens the third incisor less obliquely placed than in ~~the~~ <sup>the</sup> ~~mouth~~ of In both the third lobe of m. 3 has two cusps.

*Hastings Collection. Purchased, 1855.*

29174. Fragment of the right ramus of a mandible, containing m. 3, and the hinder part of m. 2, which may belong to the present genus or species; from the Headon beds (Upper Eocene) of Hordwell, Hampshire. The length of m. 3 is 0,021. *Hastings Collection. Purchased, 1855.*

### Genus **ANOPLOTHERIUM**, Cuvier<sup>1</sup>.

Including *Eurytherium*, P. Gervais<sup>2</sup>.

*Diplobune*, Rütimeyer<sup>3</sup> (*in parte*).

Great confusion exists in regard to the larger species here included in this genus, owing to the imperfect definition of one of Cuvier's species, and the circumstance that Gervais' *Eurytherium latipes*<sup>4</sup> was founded on bones of the feet.

The specimens of the dentition and bones of the feet of the larger forms in the Museum may be arranged in two series, as follows:—

<i>Dentition.</i>	<i>Foot-bones.</i>
A. Largest form. Paris, Vacluse, and Quercy.	A'. Largest tridactyle form. Paris, Vacluse, and Quercy.
B. Smaller form. Paris and Vacluse.	B'. Smaller tridactyle form. Paris and Vacluse.
	B''. Equal-sized didactyle form. Paris and Vacluse.
C. Still smaller form. Paris, Vacluse, and Quercy.	C''. Still smaller tridactyle form. Paris, Vacluse, and Quercy.

The specimens ranged under *A* comprehend the typical *A. magnum*, and others from Vacluse and Quercy which cannot be specifically distinguished, although there is a slight variation in the size of individual specimens from all three localities. The specimens in *A'* correspond to *Eurytherium latipes*, and as these are the largest limb-bones, the *à priori* presumption is that they belong to the same species as the largest teeth, viz. *A. commune*. This has been practically recognized by Filhol<sup>5</sup>, who provisionally refers the

<sup>1</sup> Ann. d. Muséum, vol. iii. p. 370 (1804).

<sup>2</sup> Zool. et Pal. Françaises, 1st ed. vol. ii. Exp. no. 36, p. 3 (1848-52).

<sup>3</sup> Denkschr. schw. Ges. Nat. vol. xix. art. 3, p. 74 (1862).

<sup>4</sup> Vide Zool. et Pal. Françaises, 2nd ed. pl. xxxvi.

<sup>5</sup> Ann. Sci. Géol. vol. viii. art. 1, p. 142 (1877).

29582. From *A* to *Eurytherium latipes* on the grounds that they are associated with the foot-bones of that form (*A'*), although at the same time remarking that they are practically indistinguishable from the Paris specimens of the dentition of *A. commune*.

The specimens ranged under *B* indicate a smaller form, which the writer is disposed to identify with Cuvier's *Anoplotherium secundarium*. Both the didactyle and tridactyle foot-bones from the same two localities, arranged under *B'* and *B''*, would agree in relative size very fairly with this form; and this marked difference in the foot may indicate that *B* really comprehends two species indistinguishable by dental characters alone. The foot-bones ranged under *B''* are those referred by Cuvier to *Anoplotherium commune*. The reasons against this view are the same as those for identifying *E. latipes* with that species.

The smaller teeth classed as *C* agree well in size with the limb-bones ranged under *C'*, and correspond with specimens referred by Filhol to *Anoplotherium secundarium*. Assuming, however, the correctness of the reference of the form *B* to that species, the form *C* will be distinct, and is therefore referred to another species under the name of *A. cayluense*.

The foregoing correlation requires careful verification with the specimens in the Paris Museum, and the writer has therefore merely referred specimens of the dentition to the various species mentioned below, arranging the specimens of the foot-bones in proximity to those species with which they appear to agree best, and not admitting any species founded merely on that portion of the skeleton.

The slight differences in the lower dentition of the so-called *Diplobune* do not appear to the writer to be worthy of generic distinction.

### **Anoplotherium commune, Cuvier<sup>1</sup>.**

Syn. (P) *Eurytherium latipes*, P. Gervais<sup>2</sup>.

(P) *Anoplotherium platypus*, Pomel<sup>3</sup>.

The teeth of this form indicate the largest species of the genus. The true molars are of a hypsodont type.

*Hab.* France and England.

11813. Cast of the left upper cheek-dentition, in a partially-worn condition. The original is from the Upper Eocene of Montmartre near Paris, and is preserved in the Paris

<sup>1</sup> Ann. d. Muséum, vol. iii. p. 469 (1804).

<sup>2</sup> Zool. et Pal. Françaises, 1st ed. vol. ii. Exp. no. 36, p. 3 (1848-52).

<sup>3</sup> Comptes Rendus, vol. xxxiii. p. 16 (1851).



Museum. It is figured by Cuvier in the 'Ossements Fossiles,' 2nd ed. vol. iii. pl. xlv. fig. 2. The length of the space occupied by the seven cheek-teeth is 0,155, and that by the three true molars 0,080.

*Mantell Collection. Purchased, 1836.*

- 26776, 30582.** The right and left maxillæ with the whole of the dentition, apparently belonging to the same individual; from the Upper Eocene of Débruge, near Apt (Vaucluse), France. The length of the space occupied by the seven cheek-teeth is 0,154, and that by the three true molars 0,081.

*Pomel and Bravard Collections. Purchased, 1851-2.*

- 29440 a.** The third right upper true molar, in an early condition (Fig.) of wear; from the Upper Eocene of Montmartre. This specimen is figured by Owen in the Quart. Journ. Geol. Soc. vol. xxvi. pl. xxix. fig. 11 (1870).

*Hastings Collection. Purchased, 1855.*

- 29440.** The second left upper true molar, very slightly worn; from the Upper Eocene of Montmartre.

*Hastings Collection. Purchased, 1855.*

- 29538.** The first right upper true molar, very slightly worn; from the Upper Eocene of Montmartre.

*Hastings Collection. Purchased, 1855.*

- M. 1390.** The first right upper true molar, in an early condition of wear; from the Upper Eocene of Caylux (Tarn-et-Garonne), France.

*Purchased, 1884.*

- M. 1391.** The second left upper true molar, in an early condition of wear; from the Upper Eocene of Caylux.

*Purchased, 1884.*

- 29548.** A broken second left upper true molar, in an early condition of wear; from the Upper Eocene of Montmartre.

*Hastings Collection. Purchased, 1855.*

- 168 (O. C.).** Part of the right ramus of the mandible, containing all the cheek-teeth except  $\overline{\text{pm. 1}}$ ; from the Upper Eocene of Montmartre.

*Sömmering Collection. Purchased, 1827.*

- 169 (O. C.).** Part of the left ramus of the mandible, containing all the cheek-teeth except  $\overline{\text{pm. 1}}$ ; from the Upper Eocene of Montmartre.

*Presented by Baron Cuvier.*

29582. Fragment of the left ramus of the mandible, containing  $\overline{m. 1}$  and  $\overline{m. 2}$  in *alveolo*; from the Upper Eocene of Montmartre.  
*Hastings Collection. Purchased, 1855.*
46018. The hinder portion of the left ramus of the mandible, containing the three true molars, in a well-worn condition; from the Upper Eocene of Montmartre.  
*Purchased, 1874.*
29447. Fragment of the left ramus of the mandible, containing  $\overline{m. 2}$  and  $\overline{m. 3}$ ; from the Upper Eocene of Montmartre.  
*Hastings Collection. Purchased, 1855.*
30582. The left ramus of the mandible, containing all the teeth except the first incisor and the canine; from the Upper Eocene of Débruge. The length of the space occupied by the seven cheek-teeth is 0,169, that by the last five teeth 0,137, and that by the three true molars 0,093. The latter space in No. 46018 is 0,088. A specimen figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xv. figs. 296-7, from the Quercy phosphorites, under the name of *Eurytherium latipes*<sup>1</sup>, precisely resembles the present specimen, the length of the space occupied by the last five cheek-teeth being 0,132. *Bravard Collection. Purchased, 1852.*
26787. The right ramus of the mandible, containing all the teeth, and perhaps belonging to the same individual as the last specimen; from the Upper Eocene of Débruge.  
*Pomel Collection. Purchased, 1851.*
- M. 1386. Part of the left ramus of the mandible, containing the last three premolars,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from the Upper Eocene of Caylux. This specimen agrees precisely with No. 30582, and also with the one figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xv. figs. 296-7. *Purchased, 1884.*
- M. 1387. Fragment of the right ramus of the mandible, containing  $\overline{m. 3}$  in an almost unworn condition; from the Upper Eocene of Caylux. This specimen agrees exactly with the corresponding part of No. 30582. *Purchased, 1884.*
30793. The greater part of the right ramus of the mandible of a young individual, containing the last three milk-molars,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from the Upper Eocene of Débruge. This

<sup>1</sup> The plate is lettered *Eurytherium commune*.

specimen agrees in size with No. 30582; the length of the space occupied by the three milk-molars is 0,0565, and the length of  $\frac{\text{mm. 4}}{4}$ , 0,023.

*Bravard Collection. Purchased, 1852.*

- 29550.** The second left lower premolar; from the Upper Eocene of Montmartre. *Hastings Collection. Purchased, 1855.*

*Tridactyle foot-bones belonging to the largest species of ANOPLOTHERIUM (Eurytherium latipes, Gervais, (?)=Anoplotherium commune, Cuvier).*

- 29572.** The left unciform, and an imperfect associated metacarpal; from the Upper Eocene of Montmartre. These bones are considerably larger than those of No. 11814 (page 196).

*Hastings Collection. Purchased, 1855.*

- 30599, 30603.** The right lunar and the left scaphoid; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- M. 2189, 2190.** The left third and fourth metacarpals of two individuals; from the Upper Eocene of Caylux.

*Purchased, 1885.*

- M. 1466.** The right fourth metacarpal; from the Upper Eocene of Caylux. The extreme length of this specimen is 0,117.

*Purchased, 1884.*

- 188 (O.C.).** The right third metacarpal; from the Upper Eocene of Montmartre. *Sömmering Collection. Purchased, 1827.*

- 30595.** The right third and fourth metacarpals and two proximal phalangeals, agreeing nearly in size with the preceding specimens; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- 30596.** A similar left third metacarpal; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- 30764.** The left second metacarpal; from the Upper Eocene of Débruge. This specimen is much larger than the corresponding bone in the tridactyle foot No. 30600 *a* (page 196), and agrees very closely with the specimen figured by P. Gervais in the Zool. et Pal. Françaises, pl. xxxvi. fig. 1.

*Bravard Collection. Purchased, 1852.*

- M. 2188.** The left second metacarpal; from the Upper Eocene of Caylux.

*Purchased, 1885.*

- 186 (O.C.). The left astragalus ; from the Upper Eocene of Montmartre. This specimen agrees precisely with the type astragalus of *Eurytherium latipes*, figured by P. Gervais in the Zool. et Pal. Françaises, pl. xxxvi. fig. 5. Its extreme length is 0,071, and its greatest width distally 0,053.

*Presented by Baron Cuvier.*

- 187 (O.C.). A similar left astragalus ; from the Upper Eocene of Montmartre. *Sömmering Collection. Purchased, 1827.*

29506. A slightly smaller right astragalus ; from the Upper Eocene of Montmartre.

*Hastings Collection. Purchased, 1855.*

- M. 1465. The right calcaneum ; from the Upper Eocene of Caylux. This specimen agrees with the one figured by P. Gervais in the Zool. et Pal. Françaises, pl. xxxvi. fig. 4.

*Purchased, 1884.*

29507. A large imperfect left calcaneum, differing slightly from the preceding specimen ; from the Upper Eocene of Montmartre.

*Hastings Collection. Purchased, 1855.*

29467. The left cuboid ; from the Upper Eocene of Montmartre.

*Hastings Collection. Purchased, 1855.*

- 30601, 30602. Two specimens of the cuboid ; from the Upper Eocene of Débruge. These bones, together with No. 29467, are considerably larger than the cuboids in the complete feet from Débruge and Montmartre (pages 196, 197).

*Bravard Collection. Purchased, 1852.*

- M. 1467. The left fourth metatarsal ; from the Upper Eocene of Caylux. This specimen is larger than the corresponding bone in the foot from Débruge, No. 30600 b (page 196).

*Purchased, 1884.*

- M. 2187. The right third metatarsal ; from the Upper Eocene of Caylux.

*Purchased, 1885.*

- M. 2191, M. 2192. Two third phalangeals ; from the Upper Eocene of Caylux.

*Purchased, 1885.*



**Anoplotherium secundarium**, Cuvier <sup>1</sup>.

Syn. ? *Anoplotherium laurillardii*, Pomel <sup>2</sup>.

Cuvier originally described this species on the evidence of part of the upper milk-molar dentition <sup>3</sup>, showing that it was "de grandeur un peu inférieure" to *A. commune*; but in a subsequent notice defined the latter as being of the size of an ass, and the former as that of a boar. The comparatively large size of the type milk-molars indicates the probability of the present form corresponding to *A. secundarium* rather than the next. The true molars are of a hypsodont type, and can only be distinguished from those of *A. commune* by their inferior size. In the case of detached lower teeth the distinction is very difficult.

*Hab.* France and (?) England.

- 20605.** The left maxilla, containing all the teeth except the canine; from the Upper Eocene of Débruge, near Apt (Vaucluse), France. The length of the space occupied by the seven cheek-teeth is 0,133, that by the three true molars 0,072, and that by m. 1 and m. 2 0,044.

*Bravard Collection. Purchased, 1852.*

- 26762.** The left maxilla, wanting pm. 2, m. 1, and m. 2; from the Upper Eocene of Débruge. This specimen agrees precisely with the preceding. *Pomel Collection. Purchased, 1851.*

- 30773.** Fragment of the right maxilla, containing the second and third true molars, in a well-worn condition; from the Upper Eocene of Débruge. The teeth agree in size with those of No. 20605.

*Bravard Collection. Purchased, 1855.*

- 26777.** Fragment of the right maxilla, containing two teeth similar to those of the last specimen; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- 30583.** Fragment of the left maxilla, containing m. 2 and m. 3, in an unworn condition; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- 30624.** Fragment of the right maxilla of an immature individual, (*Fig.*) containing the last three milk-molars, and m. 1 and m. 2 (broken); from the Upper Eocene of Débruge. This

<sup>1</sup> Ossements Fossiles, 2nd ed. vol. iii. p. 69 (1822).

<sup>2</sup> Comptes Rendus, vol. xxxiii. p. 16 (1851).

<sup>3</sup> *Loc. cit.*

specimen is figured in the accompanying woodcut (fig. 25). The length of m. 1 is 0,0204, which is the same as in No.

Fig. 25.



*Anoplotherium secundarium*.—Part of the right maxilla of an immature specimen; from the Upper Eocene of Débruge. †.

20605; the length of the space occupied by the three milk-molars is 0,049. The unworn condition of the molars clearly exhibits their characteristic hypsodont structure.

*Bravard Collection. Purchased, 1852.*

- 30607.** Fragment of the left maxilla of the same individual, containing mm. 4, m. 1, and m. 2; from the Upper Eocene of Débruge. *Bravard Collection. Purchased, 1852.*

- 30622.** The complete left ramus of the mandible, containing all the teeth except the innermost incisor and the canine; from the Upper Eocene of Débruge. This specimen agrees in relative size with the maxilla No. 20605: the length of the space occupied by the seven cheek-teeth is 0,139, that by the last five teeth 0,110, and that by the three true molars 0,075. *Bravard Collection. Purchased, 1852.*

- 30974.** Fragment of the right ramus of the mandible, containing the last four cheek-teeth; from the Upper Eocene of Débruge. This specimen agrees in size with the last. *Bravard Collection. Purchased, 1852.*

- 26763.** The greater part of the right ramus of the mandible, containing all the cheek-teeth except pm. 1; from the Upper Eocene of Débruge. *Pomel Collection. Purchased, 1851.*

- 30792.** The left ramus of the mandible of a young individual, containing mm. 4, m. 1, and m. 2; from the Upper Eocene of Débruge. This specimen agrees in relative size with the

adult mandible No. 30622, and is smaller than the young mandible of *A. commune*, No. 30793.

*Bravard Collection. Purchased, 1852.*

- 30797.** Fragment of the left ramus of the mandible of a young individual, containing  $\overline{\text{mm. 3}}$  and  $\overline{\text{mm. 4}}$ , and agreeing in size with the last specimen; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

- M. 2144.** Greater part of the right ramus of the mandible of a young individual, showing the last three milk-molars; from the Upper Eocene of Débruge. This specimen resembles the last two, the length of  $\overline{\text{mm. 4}}$  being 0,0215.

*Purchased, 1885.*

*Foot-bones of the second largest tridactyle form.*

- 30600 a.** The greater part of the skeleton of the right fore foot, made up from the bones of different individuals; from the Upper Eocene of Débruge. The extreme length of the fourth metacarpal is 0,102.

*Bravard Collection. Purchased, 1852.*

- 30600 b.** The greater part of the skeleton of the left hind foot, made up from the bones of different individuals; from the Upper Eocene of Débruge. It is apparently from a cast of this specimen that the figure given on page 157 (fig. 209) of Gaudry's 'Les Enchaînements—Mammifères Tertiaires' is taken, the astragalus being represented on a larger scale on page 149 (fig. 194) of the same work. The figures are referred to *Eurytherium latipes*, but the astragalus is smaller and relatively shorter than the type of that form (*suprà*, p. 193). The extreme length of the astragalus is 0,052, and its greatest width inferiorly 0,042; the corresponding dimensions of the astragalus of the so-called *E. latipes* being 0,071 and 0,053. The calcaneum differs widely from No. M. 1465 (p. 193).

*Bravard Collection. Purchased, 1852.*

- 30600 c.** A very similar left hind foot, without the astragalus; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

*Foot-bones of the equal-sized didactyle form.*

- 11814.** Cast of the bones of the right fore foot. The original is from the Upper Eocene of Montmartre, and is figured in

De Blainville's 'Ostéographie,' genus *Anoplotherium*, pl. iii., under the name of *A. commune*.

*Mantell Collection. Purchased, 1836.*

- 29469-70. The right unciform and magnum, agreeing very closely with the corresponding bones of the preceding; from the Upper Eocene of Montmartre.

*Hastings Collection. Purchased, 1855.*

- M. 2213. The left cuneiform; from the Upper Eocene of Montmartre.

*Purchased, 1885.*

- M. 2212. The proximal extremities of the two associated right metacarpals and three carpal bones; from the Upper Eocene of Montmartre.

*Purchased, 1885.*

- M. 2209. The third left metacarpal; from the Upper Eocene of Montmartre.

*Purchased, 1885.*

11816. Cast of the bones of the left hind foot. The original is from the Upper Eocene of Montmartre, and is figured in De Blainville's 'Ostéographie,' genus *Anoplotherium*, pl. iv., under the name of *A. commune*.

*Mantell Collection. Purchased, 1836.*

- M. 2221. The right metatarsals and several of the associated tarsal bones; from Montmartre. The metatarsals are rather larger than those of No. 11816.

*Purchased, 1885.*

- M. 2220. A first and second phalangeal; from the Upper Eocene of Montmartre.

*Purchased, 1885.*

- M. 2214. A third phalangeal; from the Upper Eocene of Montmartre.

*Purchased, 1885.*

*The following agree in size with the two preceding forms.*

- 26767, 30851, 30854, 30856, 30861. Five astragali, agreeing very closely with the astragalus of the tridactyle form; from the Upper Eocene of Vacluse.

*Pomel and Bravard Collections. Purchased, 1851-2.*

- 30740-1. Two specimens of the astragalus and calcaneum of opposite sides, agreeing very closely with the preceding; from the Upper Eocene of Vacluse.

*Bravard Collection. Purchased, 1852.*

- 172 (O. C.). A left calcaneum, left astragalus, and right cuboid;



from the Upper Eocene of Montmartre. The astragalus agrees very closely with that of the didactyle form.

*Presented by Baron Cuvier.*

**46729.** A left calcaneum; from the Upper Eocene of Montmartre.

*Purchased, 1874.*

**30751-54.** Five specimens of the cuboid; from the Upper Eocene of Débruge. *Bravard Collection. Purchased, 1852.*

**30726, 30730.** Two specimens of the cuboid; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

**26772, 30758-60.** Four specimens of the navicular; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

***Anoplotherium cayluxense*, Lydekker, n. sp.**

Syn. *Eurytherium secundarium*, Filhol<sup>1</sup>.

This species is polydactyle, and of somewhat smaller size than the last, from which it is readily distinguished by the brachydont structure of the upper molars, and the approximation and distinctness of the inner terminations of the anterior crescents of the lower true molars. There is a certain amount of variation in the upper true molars; the outer surfaces of the external cusps in one variety being more inwardly inclined than in another, which is thus less widely removed from *A. secundarium*. The teeth of the most brachydont variety present a striking resemblance to those of *Hypopotamus*, especially the brachydont *H. porcinus*.

*Hab.* France.

**30708.** Fragment of the right maxilla of the less brachydont variety, containing the last four cheek-teeth in an almost unworn condition; from the Upper Eocene of Débruge, near Apt (Vaucluse), France. The length of the space occupied by the three true molars is 0,051.

*Bravard Collection. Purchased, 1852.*

**M. 2514.** Cast of the greater part of the left maxilla of the same variety, showing the canine (broken) and the seven cheek-teeth. The original is from the Upper Eocene of

Caylux (Tarn-et-Garonne), France, and is in the possession of Dr. Filhol. The length of the space occupied by the seven cheek-teeth is 0,110, and that by the three true molars 0,057. *Made in the Museum, 1885.*

**M. 2142.** Fragment of the left maxilla of an immature individual of the same variety as the last; from the Upper Eocene of Caylux. The length of the space occupied by the last three milk-molars is 0,054, or less than in the corresponding specimen of *A. secundarium*, No. 30607. The first true molar is rather larger than in No. 30708, its length being 0,017, as against 0,015, the latter dimension agreeing with that of the specimen described by Filhol (*op. cit.*). *Purchased, 1885.*

**30608.** Fragment of the right maxilla of the intermediate variety; from the Upper Eocene of Débruge. This specimen shows m. 2 and m. 3, in a partially worn condition, which are slightly larger than in No. 30708, and make a nearer approach to the brachydont form. The length of the space occupied by the three true molars in a very similar specimen from Caylux, in the collection of M. Filhol, measures 0,056. *Bravard Collection. Purchased, 1852.*

**M. 2141.** Fragment of the right maxilla of the more brachydont variety, containing the last five cheek-teeth, in a partially worn condition; from the Upper Eocene of Caylux. In this specimen, which is figured in the accompanying woodcut (fig. 26), the outer surfaces of the external cusps

Fig. 26.



*Anoplotherium cayluxense*.—Part of the right maxilla of the brachydont variety; from the Upper Eocene of Caylux. †.

are inclined inwardly to an extreme extent, and the valleys are very shallow. The length of the space occupied by the three true molars is 0,0545. In a very similar speci-

men in the possession of Dr. Filhol, the length of the corresponding space is 0,057; the inclination of the outer surface of the external cusps is slightly less in that specimen. The striking resemblance of the molars of the present specimen to those of *Hyopotamus* is apparent from the figure, and leads to the inference that *Anoplotherium* and *Hyopotamus* are closely connected. *Purchased*, 1885.

- 30632.** Part of the right ramus of the mandible, containing all the cheek-teeth except  $\overline{\text{pm. 1}}$  and  $\overline{\text{m. 1}}$ ; from the Upper Eocene of Débruge. This specimen agrees with the one figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xv. figs. 298-9, under the name of *Eurytherium secundarium*, with the exception of the slightly larger size of  $\overline{\text{m. 3}}$ . The length of the space occupied by the three true molars is 0,0615. *Bravard Collection. Purchased*, 1852.

- M. 1388.** Fragment of the right ramus of the mandible, containing  $\overline{\text{m. 2}}$  and  $\overline{\text{m. 3}}$ ; from the Upper Eocene of Caylux. This specimen agrees precisely with the last. *Purchased*, 1884.

- M. 2143.** The right ramus of the mandible of a young individual, containing the last milk-molar and the three true molars; from the Upper Eocene of Caylux. The length of the space occupied by the three true molars is 0,061, the length of  $\overline{\text{m. 3}}$  0,027, and that of  $\overline{\text{mm. 4}}$  0,019; these dimensions being almost identical with those of the specimen figured by Filhol (*op. cit.*). *Purchased*, 1885.

- 30363.** The greater part of the right ramus of the mandible of a young individual, agreeing very closely with the last, and showing the incisors, canine,  $\overline{\text{pm. 1}}$ ,  $\overline{\text{mm. 2}}$ ,  $\overline{\text{mm. 3}}$ ,  $\overline{\text{mm. 4}}$ , and  $\overline{\text{m. 1}}$ ; from the Upper Eocene of Vacluse. The length of the space occupied by the three milk-molars is 0,055, and the length of  $\overline{\text{mm. 4}}$  0,018.

*Bravard Collection. Purchased*, 1852.

*Foot-bones of the third largest tridactyle form.*

- 30600 d.** Several of the bones of the right fore foot, comprising the unciform, the three metacarpals, one proximal, and two second phalangeals; from the Upper Eocene of Débruge. This specimen agrees well in size with *A. cayluxense*, the extreme length of the third metacarpal being 0,086.

*Bravard Collection. Purchased*, 1852.

- 30719.** The proximal portion of the right metacarpus, agreeing very closely with the preceding specimen; from the Upper Eocene of Vacluse. The second metacarpal in this specimen is a cast. *Bravard Collection. Purchased, 1852.*
- 30725, 30737.** Two specimens of the cuboid; from the Upper Eocene of Débruge. *Bravard Collection. Purchased, 1852.*
- 30727, 30728, 30756.** Three specimens of the navicular; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- M. 2218.** Three specimens of the second metacarpal; from the Upper Eocene of Caylux. *Purchased, 1885.*
- M. 1478-9.** The left fourth metatarsal and metacarpal; from Caylux. *Purchased, 1884.*

**Anoplotherium quercyi** (Filhol<sup>1</sup>).

Syn. *Eurytherium quercyi*, Filhol<sup>2</sup>.

*Diplobune quercyi*, Gaudry<sup>3</sup>.

This species is smaller than the preceding; it has a brachydont dentition, but the inward inclination of the outer surfaces of the external columns of the upper true molars is not so great as in some specimens of that species; *pm.* 3 is relatively shorter and narrower.

*Hab.* France.

- M. 2515.** Cast of the right maxilla, showing the canine and the seven cheek-teeth. The original, which is the type, is from the Upper Eocene of Mouillac (Tarn-et-Garonne), France, and is in the possession of Dr. H. Filhol, by whom it is described and figured in the *Ann. Sci. Géol.* vol. viii. art. 1, pp. 148-149, pl. xvi. fig. 302. The length of the space occupied by the seven cheek-teeth is 0,092, and that by the three true molars 0,046.

*Made in the Museum, 1885.*

**Anoplotherium modicum** (Filhol<sup>4</sup>)

Syn. *Eurytherium modicum*, Filhol<sup>5</sup>.

This is a brachydont species, about two thirds the size of the last.

*Hab.* France.

<sup>1</sup> *Ann. Sci. Géol.* vol. viii. art. 1, p. 148 (1877), *Eurytherium*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> *Les Enchainements—Mammifères Tertiaires*, p. 165 (1878).

<sup>4</sup> *Ann. Sci. Géol.* vol. viii. art. 1, p. 146 (1877), *Eurytherium*.

<sup>5</sup> *Loc. cit.*



- M. 2140.** Fragment of the right maxilla, containing the three true molars; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen agrees with the type mandible figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xvi. figs. 304, 305, and is too large to have belonged to *A. minus*. *Purchased*, 1885.
- M. 2405.** Fragment of the left ramus of the mandible of a small individual of the present species, showing  $\overline{m. 2}$  and  $\overline{m. 3}$ ; from Caylux. The length of  $\overline{m. 3}$  is 0,017. *Purchased*, 1885.

***Anoplotherium bavaricum* (Fraas<sup>1</sup>).**

Syn. *Diplobune bavaricum*, Fraas<sup>2</sup>.

This species agrees very closely in size with *A. modicum*, and the distinctive characters of the two are not very clear; there is a considerable difference in the length of the space occupied by the four premolars in the two specimens figured by Fraas (*loc. cit.*). The upper jaw is unknown.

*Hab.* Europe.

- M. 2139.** Fragment of the right ramus of the mandible, containing  $\overline{m. 2}$  and  $\overline{m. 3}$ ; from the Upper Eocene Bohnert of Wurtenfel, Bavaria. This specimen agrees very closely with the corresponding portions of the two mandibles figured by Fraas, *op. cit.* pl. xxxviii. figs. 1, 2. The true molars are larger than those of *Anoplotherium minus*, figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xvi. fig. 307.

*Purchased*, 1885.

***Anoplotherium minus* (Filhol<sup>3</sup>).**

Syn. *Eurytherium minus*, Filhol<sup>4</sup>.

This species is distinguished by the absence of  $\overline{pm. 1}$ ; in the type form the space occupied by the premolars is the same as that occupied by the corresponding teeth in the type of *A. bavaricum* (*Palæontographica*, vol. xvii. pl. xxxviii. fig. 1), but the true molars are considerably smaller; the upper dentition is apparently unknown.

*Hab.* Europe.

<sup>1</sup> *Palæontographica*, vol. xvii. p. 177 (1870), *Diplobune*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> *Ann. Sci. Géol.* vol. viii. art. 1, p. 151 (1877), *Eurytherium*.

<sup>4</sup> *Loc. cit.*

**M. 2407.** Fragment of the left ramus of the mandible, containing the last two premolars and the first two true molars; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen agrees very closely with the type mandible figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xvi. figs. 306, 307, but the depth of the ramus is somewhat greater. *Purchased, 1885.*

**M. 2406.** Fragment of the right ramus of a mandible, provisionally referred to this species, containing the last three premolars and  $\overline{m. 1}$ ; from the Upper Eocene of Würtemberg. The length of the space occupied by the three premolars is nearly the same as in the last specimen, and also as in the mandible of *A. bavaricum* figured by Fraas in the 'Palæontographica,' vol. xvii. pl. xxxviii. fig. 1, but the length of  $\overline{m. 1}$  is considerably less than in the latter. *Purchased, 1885.*

*Specifically undetermined limb-bones of Anoplotherium.*

**178 (O. C.).** Cast of the glenoidal extremity of the scapula of a large species. The original is from the Upper Eocene of Montmartre, and is figured (reversed) in De Blainville's 'Ostéographie,' genus *Anoplotherium*, pl. iii., under the name of *A. commune*. *Presented by Baron Cuvier.*

**30588.** The crushed right humerus of a large form (? *A. commune*); from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

**30825.** A smaller crushed right humerus (? *A. secundarium*); from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

**145 (O. C.).** The distal extremity of a large left humerus; from the Upper Eocene of Montmartre.

*Sömmering Collection. Purchased, 1827.*

**26778.** The distal half of a right humerus, agreeing in size with No. 30588; from the Upper Eocene of Débruge.

**30824.** The distal half of a right humerus, agreeing in size with No. 30823; from Débruge.

*Bravard Collection. Purchased, 1852.*

**2207.** The left humerus (wanting the proximal extremity), agreeing nearly in size with the last; from the Upper Eocene of Caylux. *Purchased, 1885.*

- 11066.** Cast of the proximal extremity of the right ulna. The original is from the Upper Eocene of Montmartre, and is figured by Cuvier in the 'Ossements Fossiles,' 2nd ed. vol. iii. pl. lxi. figs. 12, 13, as *A. commune*.  
*Mantell Collection. Purchased, 1836.*
- 29585.** The greater part of an eroded right ulna, somewhat smaller than the last specimen; from the Upper Eocene of Montmartre.  
*Hastings Collection. Purchased, 1855.*
- 30590.** The right ulna, agreeing precisely in size with No. 11066; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 30833.** The distal half of a smaller right ulna, differing from No. 11066 in the form of the extremity of the olecranon; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 26780.** The distal half of a rather smaller right ulna; from Débruge.  
*Pomel Collection. Purchased, 1851.*
- 11815.** Cast of the left radius of a large form. The original is from the Upper Eocene of Montmartre, and is figured in De Blainville's 'Ostéographie,' genus *Anoplotherium*, pl. iii., as *A. commune*.  
*Mantell Collection. Purchased, 1836.*
- 176 (O. C.).** A broken right radius, agreeing with No. 11815; from the Upper Eocene of Montmartre.  
*Presented by Baron Cuvier.*
- 30592.** A smaller right radius; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 30828.** A still smaller right radius; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 26779.** The proximal half of a right radius, slightly larger than the preceding; from the Upper Eocene of Débruge.  
*Pomel Collection. Purchased, 1851.*
- 30714.** The greater part of a left radius, agreeing nearly in size with the last, but with a much greater antero-posterior extent of the proximal surface; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 30714a.** The greater part of a smaller left radius, agreeing in

form with No. 11815; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*

**30713.** The greater part of a still smaller left radius; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

**30029.** The associated distal extremities of the right radius and ulna of a very large anoplotheroid; from the Upper Eocene of the Isle of Wight. The long diameter of the distal extremity of the radius is 0,084, as compared with 0,062 in No. 11815.

*Hastings Collection. Purchased, 1855.*

**M. 2211.** The proximal half of a right radius; from the Upper Eocene of Montmartre.

*Purchased, 1885.*

**M. 2215.** The proximal half of a left radius; from the Upper Eocene of Caylux.

*Purchased, 1885.*

**30842.** A third left metacarpal, of a massive type; from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

**184 (O. C.).** A damaged metacarpal, of an elongate type; from the Upper Eocene of Montmartre.

*Sömmering Collection. Purchased, 1827.*

**26782.** Part of the left innominate of a large form (? *A. commune*); from the Upper Eocene of Débruge. The long diameter of the acetabulum is 0,062.

*Pomel Collection. Purchased, 1851.*

**191 (O. C.).** The left ilium of a much smaller form; from the Upper Eocene of Montmartre.

*Sömmering Collection. Purchased, 1827.*

**30589.** The greater part of the left femur of a large species (? *A. commune*); from the Upper Eocene of Débruge.

*Bravard Collection. Purchased, 1852.*

**26781.** A smaller right femur, in a much-crushed condition; from the Upper Eocene of Débruge (? *A. secundarium*).

*Pomel Collection. Purchased, 1851.*

**174 (O. C.).** Head of a femur; from the Upper Eocene of Montmartre.

*Sömmering Collection. Purchased, 1827.*



- 29478.** A patella ; from the Upper Eocene of Montmartre.  
*Hastings Collection. Purchased, 1855.*
- 30594.** The much-crushed right tibia of a large form (? *A. commune*) ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 30593.** The distal part of a very similar right tibia ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 30835.** A crushed left tibia of smaller size (? *A. secundarium*) ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- M. 2220.** The left tibia, of medium size ; from the Upper Eocene of Caylux.  
*Purchased, 1885.*
- 26785.** The distal half of a large tibia ; from the Upper Eocene of Débruge.  
*Pomel Collection. Purchased, 1851.*
- 26756 a.** The distal half of a smaller tibia ; from the Upper Eocene of Débruge.  
*Pomel Collection. Purchased, 1851.*
- 30836.** The distal half of a similar tibia ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 29511.** The tibia of a very young individual ; from the Upper Eocene of Montmartre.  
*Hastings Collection. Purchased, 1855.*
- 182 (O. C.).** The left third and fourth metatarsals of a young individual of a didactyle form ; from the Upper Eocene of Montmartre.  
*Sömmering Collection. Purchased, 1827.*
- 30766, 30769.** The proximal halves of the left third and fourth metatarsals, apparently belonging to a didactyle form ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 30767-8.** The proximal extremities of the left third and fourth metatarsals of a somewhat larger form ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*
- 30597, 30765, 30770.** Three specimens of the fourth metatarsal ; from the Upper Eocene of Débruge.  
*Bravard Collection. Purchased, 1852.*

29477. The distal half of a metapodial; from the Upper Eocene of Montmartre. *Hastings Collection. Purchased, 1855.*
- M. 1571. The distal half of a metapodial; from the Upper Eocene of Montmartre. *Presented by A. Nesbitt, Esq., 1883.*
- 181 (O. C.). The distal extremity of a metapodial, with the three associated phalangeals of one side; from the Upper Eocene of Montmartre. *Presented by Baron Cuvier.*

### Family OREODONTIDÆ.

Cope<sup>1</sup> considers this family as related to the *Anoplotheriidæ*, but with more completely selenodont teeth, and less specialized feet, which are more like those of the Hippopotamus than of the Ruminants. The upper true molars have four columns on their crowns; the ulna, radius, tibia, fibula, metapodials, navicular, and cuboid are distinct. The family is probably allied both to the *Merycopotamidæ* and the *Anoplotheriidæ*.

#### Genus OREODON, Leidy<sup>2</sup>.

Syn. *Merycoidodon*, Leidy<sup>3</sup>.

*Dentition*:—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ .

The orbits are complete, the premaxillæ separate, the auditory bullæ not inflated, and there are no facial vacuities.

#### *Oreodon culbertsoni*, Leidy<sup>4</sup>.

Syn. *Merycoidodon culbertsoni*, Leidy<sup>5</sup>.

This species is divided into a larger and a smaller variety: in the former the length of the space occupied by the three upper true molars varies from 0,050 to 0,046, and in the latter from 0,042 to 0,040.

*Hab.* N. America.

42828. Cast of the cranium and mandible. The original is from the Miocene of the White River, Dakota, U.S.A.; and is figured by Leidy in the Journ. Ac. Nat. Sci. Philad. ser. 2, vol. vii. pl. vi. fig. 1. *Van Breda Collection. Purchased, 1871.*

<sup>1</sup> Proc. Amer. Phil. Soc. vol. xxi. p. 503 (1884).

<sup>2</sup> Proc. Ac. Nat. Sci. Philad. vol. v. p. 238 (1851, vol. dated 1852).

<sup>3</sup> *Ibid.* vol. iv. p. 47 (1848, vol. dated 1850).

<sup>4</sup> *Loc. cit.*, *Merycoidodon*.

<sup>5</sup> *Loc. cit.*

29681. The nearly complete cranium, showing all the cheek-teeth, which are in a well-worn condition; from the Miocene of the White River. The length of the space occupied by the three true molars is 0,0395, which agrees with that of the small form named by Cope in the Proc. Amer. Phil. Soc. vol. xxi. p. 513 (1884), var. *periculatorum*; he records that form only from Colorado and Wyoming.

*Purchased, 1855.*

29682. The middle portion of the cranium of an immature individual, showing the third and fourth milk-molars, and the three true molars, in an almost unworn condition; from the Miocene of the White River. The length of the space occupied by the three true molars is 0,048.

*Purchased, 1855.*

35910. The middle portion of the cranium, showing the hinder cheek-teeth, in a much-worn condition; from the Miocene of the White River. The length of the space occupied by the three true molars is 0,047.

*Purchased, 1860.*

29678. Fragment of the right maxilla, containing the three true molars, in an early stage of wear; from the Miocene of the White River. The length of the space occupied by the three teeth is 0,0425.

*Purchased, 1855.*

44083. Fragment of the right maxilla of an immature individual, containing the third and fourth milk-, and the first and second true molars, and four fragments of the mandible; from the Miocene of the White River.

*Purchased, 1873.*

44000. Fragment of the hinder portion of a cranium, perhaps belonging to a young individual of the present species; from the Miocene of the White River.

*Purchased, 1873.*

### Genus **EPOREODON**, Marsh<sup>1</sup>.

Syn. *Eucrotaphus*, Cope<sup>2</sup> (*ex* Leidy<sup>3</sup>).

This genus agrees with *Oreodon*, with the exception that the auditory bullæ are inflated; and the present writer has strong doubts as to its right to distinction.

<sup>1</sup> Amer. Journ. ser. 3, vol. ix. p. 249 (1875).

<sup>2</sup> Proc. Amer. Phil. Soc. vol. xxi. p. 513 (1884).

<sup>3</sup> Proc. Ac. Nat. Sci. Philad. vol. v. p. 92 (1851). This genus was discarded by Leidy, and as it is a synonym of one species of *Agriochærus*, its adoption for the present group seems undesirable.

**Eporeodon major** (Leidy<sup>1</sup>).Syn. *Oreodon major*, Leidy<sup>2</sup>.*Eucrotaphus major*, Cope<sup>3</sup>.

Hab. N. America.

**40342.** Cast of the cranium, wanting the crowns of the anterior teeth. The original is from the Miocene of the White River, Dakota, U.S.A.; and is figured by Leidy in the Journ. Ac. Nat. Sci. Philad. vol. vii. pl. viii.

*Purchased*, 1867.

**29680.** The middle portion of the cranium and mandible, showing nearly all the cheek-teeth, in an early stage of wear; from the Miocene of the White River. *Purchased*, 1855.

## Family MERYCOPOTAMIDÆ.

*Dentition*:—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ . The upper true molars are selenodont, and have four columns on the masticating surface; in other respects those of the type genus are very like the molars of the hypsodont species of *Hypopotamus*. Both genera are referred by Flower to the *Anthracotheriidae*.

Genus **MERYCOPOTAMUS**, Falconer and Cautley<sup>4</sup>.

The mandible has a deep descending process at the angle, as in *Hippopotamus*; the canines are very large and pig-like, but the extremity of the upper one is not recurved upwards.

**Merycopotamus dissimilis**, Falconer and Cautley<sup>5</sup>.Syn. *Hippopotamus dissimilis*, Falconer and Cautley<sup>6</sup>.

This species is considerably larger than the next, and is also distinguished by the wider mandibular symphysis, the much longer jaws, the straighter cranial profile, the presence of a deep fossa on the outer side of the mandible behind the canine, and the nearly flat inner surface of the third lobe of the last lower true molar. A right

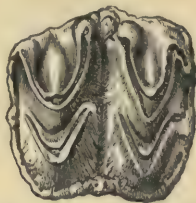
<sup>1</sup> Smith. Contrib. to Knowl. vol. vi. art. 7, p. 55 (1854).<sup>2</sup> *Loc. cit.*<sup>3</sup> Proc. Amer. Phil. Soc. vol. xxi. p. 519 (1884).<sup>4</sup> In Owen's 'Odontography,' p. 566 (1840-45).<sup>5</sup> 'Asiatic Researches,' vol. xix. p. 51 (1836), *Hippopotamus*.<sup>6</sup> *Loc. cit.*



upper true molar belonging to this or the next species is figured in the accompanying woodcut (fig. 27).

*Hab.* India.

Fig. 27.



*Merycopotamus*, sp.—A right upper true molar; from the Siwaliks of the Punjab. †. Indian Museum. (From the 'Palæontologia Indica'<sup>1</sup>.)

**18441.** The cranium, wanting the muzzle, in a much-battered condition; from the Pliocene of the Siwalik Hills, India. (*Fig.*) This specimen, which may be taken as the type of the species, is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxvii. fig. 1. The four last cheek-teeth are shown; the first two true molars are partially worn, but m. 3 is untouched; the cusps of the molars are relatively tall. The profile of the hinder portion of the cranium is nearly straight, the sagittal crest being well developed. *Cautley Collection. Presented, 1842.*

**17000.** Fragment of the left maxilla, containing the three true molars; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

**48439.** Fragment of the right maxilla, containing the second and third true molars, in an unworn but broken condition; from the Pliocene of the Siwalik Hills.

*Presented by C. Falconer, Esq., 1867.*

**18445.** Portion of the right upper jaw, showing the inferior border of the orbit, and the second and third true molars, in a worn and broken condition; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*

**18442.** The complete right ramus of the mandible of a male, showing the whole of the dentition, but with the crowns of

<sup>1</sup> By the courtesy of the Superintendent of the Geological Survey of India, this figure has been permitted to appear before its publication in the 'Palæontologia Indica.'

most of the teeth hammered off; from the Pliocene of the Siwalik Hills. This specimen is figured by Falconer and Cautley, *op. cit.* pl. lxvii. fig. 4. The interval between the canine and the hinder border of *m.* 3 is 0,198; and the antero-posterior diameter of the base of the canine 0,029.

*Cautley Collection. Presented, 1842.*

18444. The left half of the symphysis of the mandible of a female, (Fig.) showing the alveoli of the incisors and the broken base of the canine; from the Pliocene of the Siwalik Hills. This specimen agrees with 18442 in its wide symphysis and the deep fossa on the outer side, behind the canine. The antero-posterior diameter of the latter is 0,018. The specimen is figured by Falconer and Cautley, *op. cit.* pl. lxxviii. fig. 18. *Cautley Collection. Presented, 1842.*

18443. The greater portion of the mandible of a young male, with (Fig.) the milk-teeth, of which the crowns are wanting; from the Pliocene of the Siwalik Hills. This specimen is figured by Falconer and Cautley, *op. cit.* fig. 17.

*Cautley Collection. Presented, 1842.*

17002. The anterior portion of the right ramus of the mandible of a young animal, probably belonging to the present species, with the crowns of the teeth hammered off; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

***Merycopotamus nanus*, Lydekker<sup>1</sup> (*ex Falc. MS.*).**

Syn. *Merycopotamus dissimilis*, Falconer and Cautley (*in parte*).

The distinctive characters of this smaller species are noted under the head of *M. dissimilis*.

*Hab.* India.

16551. The cranium of a male; from the Pliocene of the Siwalik (Fig.) Hills, India. This specimen is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxvii. fig. 3, under the name of *M. dissimilis*, var. *major*. The whole of the dentition is shown, although the crowns of the earlier premolars are broken off; all the true molars are well worn. The cusps of these teeth are lower than those of *M. dissimilis*; the length of the space occupied by the three true molars is 0,0655, as against 0,082 in *M. dissimilis* (No. 18441); the interval between the canine and

<sup>1</sup> Geol. Mag. dec. 3, vol. i. p. 545 (1884).

the hinder border of  $\overline{m. 3}$  measures 0,141; the canine, of which the terminal portion is broken away, is relatively large, its antero-posterior diameter measuring 0,023.

*Cautley Collection. Presented, 1842.*

- 16552.** The cranium of a female; from the Pliocene of the Siwalik Hills. This specimen is figured by Falconer and Cautley, *op. cit.* fig. 5, under the name of *M. dissimilis*, var. *minor*. It is in a somewhat battered condition, but shows the whole of the dentition except the incisors, although the crowns of the earlier premolars are hammered off; the first and second true molars are in a well-worn condition. The whole skull is considerably smaller than the last specimen; the canine is relatively smaller, its antero-posterior diameter at the base being 0,018. The length of the space occupied by the three true molars is 0,066; and the interval between the canine and the hinder border of  $\overline{m. 3}$  0,134. The profile of the hinder portion of the cranium being strongly arcuated, is in striking contrast to the same part in *M. dissimilis*.

*Cautley Collection. Presented, 1842.*

- 18407.** The greater portion of the left ramus of the mandible of a male, containing the canine,  $\overline{pm. 3}$ ,  $\overline{pm. 4}$ ,  $\overline{m. 2}$ ,  $\overline{m. 3}$ , and the alveoli of the remaining cheek-teeth; from the Pliocene of the Siwalik Hills. The specimen is figured by Falconer and Cautley, *op. cit.* fig. 8. It agrees precisely in size with the male cranium; the interval between the canine and the hinder border of  $\overline{m. 3}$  is 0,163, and the antero-posterior diameter of the canine 0,0295; the molars are well worn.

*Cautley Collection. Presented, 1842.*

- 15349.** The greater portion of the right ramus of the mandible of a female; from the Pliocene of the Siwalik Hills. This specimen is figured by Falconer and Cautley, *op. cit.* fig. 7; it shows the last true molar in a well-worn condition, the bases of the preceding cheek-teeth, and a section of the canine. The interval between the canine and the hinder border of  $\overline{m. 3}$  seems to have been nearly the same as in the last specimen; but the antero-posterior diameter of the base of the canine is only 0,020. The third lobe of  $\overline{m. 3}$  is distinguished from that of *M. dissimilis* by the distinct concavity of its outer surface.

*Cautley Collection. Presented, 1842.*

16678. Fragment of the right ramus of the mandible, containing the second and third true molars, in a partially worn condition; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

*Specimens belonging to one or other of the above species.*

16999. Fragment of the left maxilla, with the three true molars, in a much-worn and broken condition; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*

15361. Fragment of the right maxilla, containing m. 1 and m. 2, in a much-worn condition; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*

16616. Fragment of the mandible; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*

- M. 22. Fragment of the left ramus of the mandible, with  $\overline{m. 3}$ ; from (Fig.) the Pliocene of the Siwalik Hills. This specimen is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxvii. fig. 4.

*Transferred from the Old Indian Museum, 1880.*

16615. Fragment of the right ramus of the mandible, with the teeth, in a much-worn condition; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*

16674. Fragment of the left ramus of the mandible, with the crowns of the teeth hammered off; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*

16677. Fragment of the left ramus of the mandible, showing  $\overline{m. 3}$ , with its cusps broken off; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*

17972. The upper portion of the occiput; from the Pliocene of the (Fig.) Siwalik Hills. This specimen is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxviii. fig. 15.

*Cautley Collection. Presented, 1842.*

*The following specimens are referred to the present genus on the authority of Falconer; and were all obtained from the Pliocene of the Siwalik Hills. They belong to the Cautley Collection, unless otherwise stated:—*

17974. The proximal extremity of the left humerus. This specimen (Fig.) is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxviii. fig. 12.



17373. The proximal extremity of the left humerus. This specimen (*Fig.*) is figured, *op. cit.* fig. 11.
17975. The distal extremity of the right humerus. This specimen (*Fig.*) is figured, *op. cit.* fig. 13.
17977. The right ulna, wanting the olecranon. This specimen is (*Fig.*) figured, *op. cit.* fig. 14.
17976. The right acetabulum. This specimen is figured, *op. cit.* fig. 1.
17978. The proximal portion of the left femur. This specimen is (*Fig.*) figured, *op. cit.* fig. 3.
17979. The distal extremity of the left femur. This specimen is (*Fig.*) figured, *op. cit.* fig. 4.
17980. The proximal extremity of the left tibia. This specimen (*Fig.*) is figured, *op. cit.* fig. 5.
17981. The proximal portion of the left calcaneum. This specimen is figured, *op. cit.* fig. 6.
17982. The distal portion of the left calcaneum. This specimen (*Fig.*) is figured, *op. cit.* fig. 7.
17983. The distal portion of the right calcaneum. This specimen is (*Fig.*) figured, *op. cit.* fig. 8.
39690. The left astragalus.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

### **Merycopotamus pusillus**, Lydekker<sup>1</sup>.

This species is considerably smaller than the last; the one known upper true molar has a very distinct cingulum, and a smoother enamel, and a lesser degree of inclination of the external surfaces of the outer columns than in the two preceding species, and in this respect approaches *Chæromeryx*<sup>2</sup>.

*Hab.* India.

40765. Cast of a fragment of the right maxilla, with the third true molar. This specimen (fig. 28) is the type, and is preserved in the Indian Museum, Calcutta; it was obtained from the Siwaliks of Khushálghar, below Attock, Punjab. It is

<sup>1</sup> Rec. Geol. Surv. Ind. vol. xviii. p. 146 (1885).

<sup>2</sup> *Suprà*, p. 165.

noticed in 'Falconer's Palæontological Memoirs,' vol. i. p. 416, under the name of *M. nanus*; its length is 0,195 and its width 0,020. The writer proposes to figure the specimen in the Introduction to the third volume of series 10 of the 'Palæontologia Indica.'

Made in the Museum, 1885.

Fig. 28.



*Merycopotamus pusillus*.—The third right upper true molar; from the Siwaliks of Khushálghar.  $\frac{1}{2}$ . Indian Museum, Calcutta. (From the 'Palæontologia Indica' <sup>1</sup>.)

### Family ANTHRACOTHERIIDÆ.

*Dentition* (usually):—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ : in *Anthracotherium gresslyi* the premolars are  $\frac{4}{3}$ . The upper true molars are imperfectly selenodont, and have four columns on their crowns, three of which are situated on the anterior, and two on the posterior lobe. Except in *Diplopus*, where they are reduced to two, the digits are four in number on each foot; the metapodials and the navicular and cuboid are always separate.

### Genus **DIPLOPUS**, Kowalevsky <sup>2</sup>.

This genus is known solely by limb-bones and vertebræ, which present a strong general resemblance to those of *Hyopotamus*. Kowalevsky conjectured that the teeth were like those of the latter; but no such teeth are known from the Headon beds. The teeth of *Dichodon* from the same beds indicate a smaller animal. Till the dentition is known, the position of *Diplopus* must remain uncertain.

<sup>1</sup> By the courtesy of the Superintendent of the Geological Survey of India, this figure has been permitted to appear before its publication in the 'Palæontologia Indica.'

<sup>2</sup> Phil. Trans. for 1873, p. 30 (1874).

**Diplopus aymardi**, Kowalevsky<sup>1</sup>.*Hab.* Europe.

- 29739.** The right scapula ; from the Headon beds (Upper Eocene) (Fig.) of Hordwell, Hampshire. This specimen (which, together with the other figured specimens noticed below, is the type of the genus and species) is described and figured by Kowalevsky in the *Phil. Trans.* 1873, p. 30, pl. xxxv. fig. 1.  
*Hastings Collection. Purchased, 1855.*
- 30060.** The glenoidal half of the left scapula ; from the Headon beds of Hordwell. *Hastings Collection. Purchased, 1855.*
- 30160.** The right humerus, wanting the head ; from the Headon (Fig.) beds of Hordwell. This specimen is described and figured by Kowalevsky, *op. cit.* p. 32, pl. xxxv. fig. 4.  
*Hastings Collection. Purchased, 1855.*
- 30117.** The distal half of the right humerus ; from the Headon beds of Hordwell. *Hastings Collection. Purchased, 1855.*
- 29723.** The left humerus, wanting the head ; from the Headon beds of Hordwell. *Hastings Collection. Purchased, 1855.*
- 29745.** The right ulna ; from the Headon beds of Hordwell. (Fig.) Described and figured by Kowalevsky, *op. cit.* p. 34, pl. xxxvi. fig. 1. *Hastings Collection. Purchased, 1855.*
- 29745 a.** The proximal half of the left ulna ; from the Headon beds of Hordwell. *Hastings Collection. Purchased, 1855.*
- 30119.** The proximal half of the left third metacarpal ; from the (Fig.) Headon beds of Hordwell. Described and figured by Kowalevsky, *op. cit.* p. 83, pl. xxxviii. fig. 6.  
*Hastings Collection. Purchased, 1855.*
- 36788.** The left fourth metacarpal ; from the Headon beds of (Fig.) Brockenhurst, Hampshire. Described and figured by Kowalevsky, *op. cit.* p. 83, pl. xxxviii. fig. 6.  
*Presented by S. Laing, Esq., 1862.*
- 30186.** The greater portion of a left innominate, provisionally referred to this species ; from the Headon beds of Hordwell.  
*Hastings Collection. Purchased, 1855.*
- 30128.** The left femur, wanting the distal extremity ; from the Headon beds of Hordwell.  
*Hastings Collection. Purchased, 1855.*

<sup>1</sup> *Phil. Trans.* for 1873, p. 30 (1874).

- 29747.** The right tibia, imperfect proximally; from the Headon  
(*Fig.*) beds of Hordwell. Described and figured by Kowalevsky,  
*op. cit.* pl. xxxvi. fig. 7.

*Hastings Collection. Purchased, 1855.*

- 36787.** The right tibia, imperfect proximally; from the Headon beds  
of Brockenhurst. *Presented by S. Laing, Esq., 1862.*

- 30162.** The right tibia, imperfect proximally; from the Headon  
beds of Hordwell.

*Hastings Collection. Purchased, 1855.*

- 30187.** A smaller left tibia, imperfect proximally; from the  
Headon beds of Hordwell.

*Hastings Collection. Purchased, 1855.*

- 30179.** The distal portion of the right fibula; from the Headon  
(*Fig.*) beds of Hordwell. Described and figured by Kowalevsky,  
*op. cit.* p. 87, pl. xxxviii. figs. 3 and 4.

*Hastings Collection. Purchased, 1855.*

- 30180.** The distal extremity of the left fibula; from the Headon beds  
of Hordwell. *Hastings Collection. Purchased, 1855.*

- 30107.** An astragalus, provisionally referred to the present species;  
from the Headon beds of Hordwell.

*Hastings Collection. Purchased, 1855.*

- 30177.** The right calcaneum; from the Headon beds of Hordwell.  
(*Fig.*) Described and figured by Kowalevsky, *op. cit.* pl. xxxv.  
fig. 4.

*Hastings Collection. Purchased, 1855.*

- 30182.** The proximal half of the right calcaneum; from the Headon  
beds of Hordwell. *Hastings Collection. Purchased, 1855.*

- 29721.** The distal elements of the right tarsus, together with the  
(*Fig.*) associated third and fourth metatarsals (imperfect); from  
the Headon beds of Hordwell. Described and figured by  
Kowalevsky, *op. cit.* p. 87, pl. xxxviii. figs. 3 and 4.

*Hastings Collection. Purchased, 1855.*

- 30069.** The proximal half of a larger right third metatarsal, with  
the associated distal elements of the tarsus; from the  
Headon beds of Hordwell.

*Hastings Collection. Purchased, 1855.*

- 30118.** The right fourth metatarsal, agreeing in size with the last  
(*Fig.*) specimen; from the Headon beds of Hordwell. Described



and figured by Kowalevsky, *op. cit.* pl. xxxv. fig. 5 (together with the third metatarsal and the phalangeals). In the description of the plate the specimen is erroneously said to be from Brockenhurst, and is referred to the left side.  
*Hastings Collection. Purchased, 1855.*

**30131.** The proximal portion of the right third metatarsal; from the Headon beds of Hordwell.

*Hastings Collection. Purchased, 1855.*

**36789.** The left third metatarsal; from the Headon beds of Brockenhurst.

*Presented by S. Laing, Esq., 1862.*

**30173.** An atlas vertebra, provisionally referred to the present species; from the Headon beds of Hordwell.

*Hastings Collection. Purchased, 1855.*

### Genus **HYOPOTAMUS**, Owen<sup>1</sup>.

Syn. *Ancodus*, Pomel<sup>2</sup>.

*Bothriodon*, Aymard<sup>3</sup>.

*Cyclognathus*, Croizet<sup>4</sup> (*teste* Kowalevsky).

It has been shown by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. p. 162, that there is such a complete transition in the characters of the upper molars from the brachydont type of *Anthracotherium* to the typical hypsodont type of *Hyopotamus* that no distinction can really be drawn between the two genera, although the retention of the latter for the more hypsodont forms may, perhaps, be convenient; the teeth of *H. porcinus* noticed below fully confirm this conclusion. The elongated pm. 3 of *H. picteti* indicates affinity with *Xiphodon*. The metapodials are less stout than in *Anthracotherium*, and the third and fourth relatively smaller.

### **Hyopotamus velaunus** (Cuvier<sup>5</sup>).

Syn. *Anthracotherium velaunum*, Cuvier<sup>6</sup>.

*Ancodus velaunus*, Pomel<sup>7</sup>.

<sup>1</sup> Quart. Journ. Geol. Soc. vol. iv. p. 103 (1848), read 1847.

<sup>2</sup> Arch. Sci. Phys. Nat. ser. 4, vol. viii. p. 324 (1848).

<sup>3</sup> Ann. Soc. Agric. Sci. le Puy, vol. xii. (1848) (*teste* P. Gervais).

<sup>4</sup> Not found.

<sup>5</sup> In Meyer's 'Palæologica,' p. 82 (1832). The name does not occur in the 'Ossements Fossiles,' 2nd ed. vol. v. pt. 2, p. 506 (1824). The synonymy is taken from Filhol, in the Ann. Sci. Géol. vol. xii. art. 3, p. 189. A confusion in this respect is noticed in the 'Palæontologia Indica,' ser. 10, vol. ii. p. 156.

<sup>6</sup> *Loc. cit.*

<sup>7</sup> 'Catalogue Méthodique,' p. 92 (1853).

*Ancodus incertus*, Pomel <sup>1</sup>.

*Bothriodon platyrhynchus*, Aymard <sup>2</sup>.

*Hyopotamus borbonicus*, P. Gervais <sup>3</sup>.

*Hyopotamus vectianus*, Owen <sup>4</sup> (*in parte*).

The mandibles of the smaller hypsodont *Hyopotamus* from the Hempstead beds of the Isle of Wight are indistinguishable from those of the typical Ronzon *H. velaunus*, and are accordingly referred to the same species <sup>5</sup>. It has not, however, been found possible to separate the upper teeth of the smaller Isle-of-Wight species from those of *H. bovinus* (*q. v.*), as an associated series has not been found. The present species is a hypsodont form, distinguished from *H. bovinus* by its smaller teeth and well-marked cranial differences.

*Hab.* Europe.

**M. 1946.** Cast of the cranium. The original is from the Lower Miocene of Ronzon, near Puy-en-Velay (Haute-Loire), France; it is figured by Kowalevsky in the Phil. Trans. for 1873, pl. xl. figs. 1, 2, and is apparently the same as the one figured by Filhol in the Ann. Sci. Géol. vol. xii. pls. xvii., xviii. *Presented by Dr. Kowalevsky.*

**M. 1947.** Cast of the left ramus of the mandible of a young individual, showing the milk-dentition. The original is from the Lower Miocene of Ronzon; and is figured by Kowalevsky, *op. cit.* figs. 3, 4 (the latter enlarged), and also by Filhol, *op. cit.* pl. xxii. fig. 102. The teeth are considerably smaller than those of the immature mandible of *H. bovinus*, No. 29802, on which account the specimen is referred to the present smaller species.

*Presented by Dr. Kowalevsky.*

**M. 1948.** The left ramus of the mandible of a young individual, with the milk-dentition; from the Lower Miocene of Ronzon.

*Presented by Dr. Kowalevsky.*

**M. 2181.** Fragment of the right ramus of the mandible of an immature individual, showing  $\overline{\text{mm. 3}}$ ,  $\overline{\text{mm. 4}}$ , and a part of  $\overline{\text{m. 1}}$ ; from the Lower Miocene of Ronzon. This specimen agrees with the two preceding ones, the length of  $\overline{\text{mm. 4}}$  being 0,0205.

*Purchased, 1885.*

<sup>1</sup> Catalogue Méthodique, p. 92 (1853).

<sup>2</sup> Ann. Soc. Agric. Sci. le Puy, vol. xii. 1848 (*teste* Filhol).

<sup>3</sup> Zool. et Pal. Françaises, ed. 1, vol. ii. Exp. No. 23, p. 1 (1848-52).

<sup>4</sup> Quart. Journ. Geol. Soc. vol. iv. p. 103 (1848).

<sup>5</sup> *Vide* Lydekker, Geol. Mag. dec. 3, vol. i. p. 547 (1884).

- 29689.** Fragment of the right maxilla containing two true molars (the first broken); from the Lower Miocene of Ronzon. The teeth agree with those of the cranium figured by Filhol, *op. cit.* pl. xvi. *Presented by the Earl of Enniskillen.*
- 29621.** Cast of a third lower true molar and an upper molar, provisionally referred to the present species; from the Lower Miocene of Ronzon. *Presented by the Earl of Enniskillen.*
- 27774.** Part of the right ramus of the mandible, containing the last four cheek-teeth, in a much-worn condition; from the Lower Miocene of Ronzon. The length of the space occupied by the three true molars is 0,072. *Croizet Collection. Purchased, 1848.*
- 27787.** A last right lower true molar, belonging either to this or the next species; from the Lower Miocene of Ronzon. *Croizet Collection. Purchased, 1848.*
- 27771.** The third left lower milk-molar; from the Lower Miocene of Ronzon. This specimen is precisely like the corresponding tooth in No. M. 1948. *Croizet Collection. Purchased, 1848.*
- 29784.** The symphysis and the greater portion of the left ramus (Fig.) of the mandible; from the Hempstead beds (Lower Miocene) of the Isle of Wight. This specimen is figured by Owen, *loc. cit.* pl. viii. figs. 1-4, under the name of *H. vectianus*; it shows the alveoli of the incisors and the canine, the third and fourth premolars (the latter not fully protruded), and the three true molars. The length of the space occupied by the three true molars is 0,071; that of the corresponding space in a mandible of the continental form described by Filhol in the *Ann. Sci. Géol.* vol. xii. art. 3, p. 125, being 0,074. The length of the third molar is 0,033, or the same as that of the Ronzon specimens (Filhol, *op. cit.* p. 128); that of  $\overline{m. 3}$  in *H. bovinus* (No. 29754) being 0,044. *Hastings Collection. Purchased, 1855.*
- 29782.** Portion of the right ramus of the mandible, containing  $\overline{pm. 4}$ ,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from the Hempstead beds of the Isle of Wight. The length of  $\overline{pm. 4}$  is 0,017, as against 0,019 in *H. bovinus* (No. 29753). *Hastings Collection. Purchased, 1855.*

29779. Part of the right ramus of the mandible, containing  $\overline{\text{pm. 4}}$  and the three true molars; from the Hempstead beds of the Isle of Wight. The length of the space occupied by the three true molars is 0,072.

*Hastings Collection. Purchased, 1855.*

29783. Part of the right ramus of the mandible, containing the second and third true molars; from the Hempstead beds of the Isle of Wight. The length of  $\overline{\text{m. 3}}$  is 0,031.

*Hastings Collection. Purchased, 1855.*

29769. Fragment of the left ramus of the mandible, with the third true molar; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

28971. Fragment of the left ramus of the mandible, containing  $\overline{\text{pm 4}}$  and  $\overline{\text{m 1}}$ ; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

36974. The fourth right lower milk-molar; from the Hempstead beds of the Isle of Wight. The length of this tooth is 0,023, or the same as that of the Ronzon specimen No. M. 1947; and considerably larger than that of *H. bovinus*, No. 29802.

*Hastings Collection. Purchased, 1848.*

### ***Hyopotamus bovinus*, Owen<sup>1</sup>.**

Syn. *Bothriodon leptorhynchus*, Aymard<sup>2</sup>.

*Ancodus leptorhynchus*, Pomel<sup>3</sup>.

*Ancodus aymardi*, Pomel<sup>4</sup>.

*Ancodus insignis*, Filhol

*Ancodus macrorhinus*, Pomel<sup>5</sup>.

*Bothriodon velaunus*, Aymard<sup>7</sup>.

*Ancodus bovinus*, Filhol<sup>8</sup>.

The synonymy of the continental forms is given on the authority of Filhol, who considers that the form known as *H. (A.) aymardi* is probably the female of the so-called *H. (A.) leptorhynchus*. With

<sup>1</sup> Quart. Journ. Geol. Soc. vol. iv. p. 103 (1848).

<sup>2</sup> Ann. Soc. Agric. Sci. le Puy, vol. xii., 1848 (*teste* Filhol).

<sup>3</sup> Catalogue Méthodique, p. 92 (1853).

<sup>4</sup> *Ibid.* p. 92.

<sup>5</sup> Not found: quoted in Ann. Sci. Géol. vol. xii. art. 3, with a wrong reference.

<sup>6</sup> *Loc. cit.* p. 92.

<sup>7</sup> *Loc. cit.* (*teste* Filhol). Regarding this name, see 'Palæontologia Indica, ser. 10, vol. ii. p. 155.

<sup>8</sup> Ann. Sci. Géol. vol. xii. art. 3, p. 189 (1881; vol. dated 1882).



regard to the Hempstead hypsodont form of the genus, the associated series of upper cheek-teeth and mandibles in the Museum collection agree precisely with the corresponding parts of the so-called *H. leptorhynchus* from Ronzon, and the two have therefore been identified<sup>1</sup>. The specific names *bovinus* and *leptorhynchus* were apparently published in the same year; but as the memoir in which the former name occurs was read in November 1847, and was published in a better-known serial than the latter, the name *H. bovinus* is adopted for the species. With regard to the upper teeth figured by Owen (*op. cit.* pl. viii. figs. 6, 7) as an associated series under the name of *H. vectianus*, it appears from the specimens in the Museum collection that they really belong to different individuals, as is indeed shown by the circumstance that at the time of the protrusion of m. 3, mm. 4 (which is reckoned by Owen as pm. 4) would have been replaced by pm. 4; the tooth figured as m. 3 is, moreover, too small in proportion to the preceding teeth. That some of these smaller upper teeth really belong to *H. velaunus* (= *H. vectianus*) is most probable; but it has been found impossible to distinguish them from those of *H. bovinus*, as a series of detached upper molars might respectively be equally well regarded as m. 1, m. 2, and m. 3 of *H. velaunus*, or as mm. 4, m. 1, and m. 2 of *H. bovinus*. Under these circumstances, and since no associated series of the upper molars of the smaller form are known from the Isle of Wight, all the upper teeth are referred to *H. bovinus*; but it must be borne in mind that in the cases of isolated small teeth, or two associated small teeth, it is quite probable they may belong to *H. velaunus*, when they will occupy one place earlier in the series than is here assigned them.

*H. bovinus* is a typical hypsodont form.

*Hab.* Europe.

**M. 1941.** Cast of the greater portion of the cranium, showing all the dentition except the incisors, of which the alveoli remain. The original of this specimen is the type of *H. leptorhynchus*, and is from the Lower Miocene of Ronzon, near Puy-en-Velay (Haute-Loire), France; it is figured by Kowalevsky in the Phil. Trans. for 1873, pl. xxxix. fig. 1, under the name of *Hyopotamus* sp., and by Filhol in the Ann. Sci. Géol. vol. xii. pl. xv., under the name of *Ancodus leptorhynchus*. Presented by Dr. Kowalevsky.

**30055.** The occiput, in a crushed condition; from the Hempstead beds (Lower Miocene) of the Isle of Wight. This speci-

<sup>1</sup> *Vide* Geol. Mag. dec. 3, vol. i. p. 547 (1884).

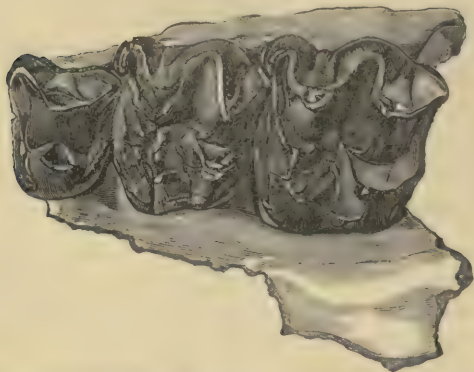
men agrees precisely with the occiput of the last; and differs from that of *H. velaunus* figured by Filhol, *op. cit.* pl. xx. fig. 96. *Hastings Collection. Purchased, 1855.*

- M. 1944.** Cast of the palate of a young individual, with the milk-dentition. The original is from the Lower Miocene of Ronzon; and is apparently the one figured by Filhol, *op. cit.* pl. xxvi. fig. 131, under the name of *Ancodus leptorhynchus*. *Presented by Dr. Kowalevsky.*
- M. 2180.** Part of the palate of a young specimen, showing the last three milk-molars and m. 1; from the Lower Miocene of Ronzon. This specimen is precisely similar to No. M. 1944. *Purchased, 1885.*
- M. 1942.** Fragment of the left maxilla, containing the three true molars; from the Lower Miocene of Ronzon. The length of the space occupied by the three cheek-teeth is precisely the same as in the Hempstead specimen No. 29758. *Presented by Dr. Kowalevsky.*
- 29761.** The third left upper true molar; from the Hempstead beds (*Fig.*) of the Isle of Wight. This specimen is the type of the species, and is figured by Owen, *op. cit.* pl. vii. figs. 1 & 5. *Hastings Collection. Purchased, 1855.*
- 29758.** Fragment of the left maxilla, containing the four last cheek-teeth; from the Hempstead beds of the Isle of Wight. The length of the space occupied by the three true molars is 0,0715; the corresponding length in the Ronzon cranium No. M. 1941 being 0,071<sup>1</sup>. The length of m. 3 is 0,035 and 0,030 in the two specimens; and that of pm. 4 0,014 in both. It is to a great extent on the evidence of this specimen that the so-called *H. leptorhynchus* is identified with the present species. *Hastings Collection. Purchased, 1855.*
- M. 2183.** The third right upper true molar; from the Hempstead beds of the Isle of Wight. *Purchased, 1885.*
- 29650.** A broken right upper true molar; from the Lower Miocene of Ronzon. *Croizet Collection. Purchased, 1848.*
- M. 1902.** Fragment of the left maxilla containing the last pre- (*Fig.*) molar, the first and second true molars, and the alveolus

<sup>1</sup> Filhol, in the Ann. Sci. Géol. vol. xii. art. 3, p. 152, gives this dimension as 0,075.

of m. 3; from the Hempstead beds of the Isle of Wight. This specimen is figured in the accompanying woodcut (fig. 29). Judging from the size of its alveolus, the last

Fig. 29.



*Hyopotamus bovinus*.—Last left upper premolar and first and second true molars. From the Hempstead beds. †.

true molar of this jaw must have agreed precisely with the corresponding tooth of No. 29758.

*Presented by Sir R. Owen, K.C.B., 1884.*

**M. 1902 a.** The third right upper true molar; from the Hempstead beds of the Isle of Wight. This very perfect and unworn specimen, which is represented in the accompanying woodcut (fig. 30), is slightly larger than the type tooth

Fig. 30.



*Hyopotamus bovinus*.—The third right upper true molar; from the Hempstead beds. †.

(No. 29761); and agrees in size with the alveolus of the corresponding tooth in the last specimen.

*Presented by Sir R. Owen, K.C.B., 1884.*

- 29772.** A right upper true molar; from the Hempstead beds of the (Fig.) Isle of Wight. This specimen is figured by Owen, *op. cit.* pl. vii. fig. 6, as m. 1 of *H. vectianus*; it agrees in size with m. 1 of No. M. 1902.

*Hastings Collection. Purchased, 1855.*

- 40207.** Fragment of the right maxilla, containing the second and third true molars in a somewhat battered condition; from the Hempstead beds of the Isle of Wight.

*Presented by F. E. Edwards, Esq., 1867.*

- 29762.** Fragment of the right maxilla, containing the first and second true molars; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

- 37327.** Fragment of the left maxilla, containing the first and second true molars; from the Hempstead beds of the Isle of Wight.

*Presented by F. E. Edwards, Esq., 1863.*

- 37327 a.** Fragment of the left maxilla, containing two true molars in a much-worn condition; from the Hempstead beds of the Isle of Wight.

*Presented by F. E. Edwards, Esq., 1863.*

- 40208.** Fragment of the right maxilla, containing a portion of m. 2, and the complete m. 3 in an unworn condition; from the Hempstead beds of the Isle of Wight.

*Presented by F. E. Edwards, Esq., 1867.*

- 29761, 29762\*, 29759, 29836, 29837.** Six specimens of detached upper true molars; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

- 29760, 29766, 29770, 29805, 29895.** Six detached upper true molars; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

- 36812 a.** A first right upper true molar; from the Hempstead beds of the Isle of Wight.

*Presented by S. Laing, Esq., 1862.*

- 29898.** The right upper true molar, with the cusps broken; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*



29844. Fragment of the right maxilla, containing the last milk-molar and m. 1 ; the latter is slightly smaller than m. 1 of No. M. 1902 ; from the Hempstead beds of the Isle of Wight.  
*Hastings Collection. Purchased, 1855.*
29769. Fragment of the right maxilla, containing mm. 3 and mm. 4, in a battered condition ; from the Hempstead beds of the Isle of Wight. This specimen agrees precisely with No. M. 1944, and is therefore referred to the present species.  
*Hastings Collection. Purchased, 1855.*
- 29769 a. Two specimens (one broken) of the last right upper milk-molar ; from the Hempstead beds of the Isle of Wight.  
*Hastings Collection. Purchased, 1855.*
29778. The penultimate right upper milk-molar, in a partially worn condition ; from the Hempstead beds of the Isle of Wight. (*Fig.*) This specimen is figured by Owen (*op. cit.* pl. vii. figs. 6, 7) as pm. 3 under the name of *H. vectianus*.  
*Hastings Collection. Purchased, 1855.*
29771. The penultimate left upper milk-molar, in a partially worn condition ; from the Hempstead beds of the Isle of Wight.  
*Hastings Collection. Purchased, 1855.*
29774. The penultimate right upper milk-molar, in an unworn condition ; from the Hempstead beds of the Isle of Wight.  
*Hastings Collection. Purchased, 1855.*
27777. Fragment of the right maxilla, containing the third and fourth milk-molars and a portion of the first true molar ; from the Lower Miocene of Ronzon. This specimen agrees precisely with Nos. M. 1944 and 29769 ; on which grounds the latter is referred to the present species.  
*Croizet Collection. Purchased, 1848.*
- 29780, 29923. Two specimens of the last left upper premolar ; from the Hempstead beds of the Isle of Wight.  
*Hastings Collection. Purchased, 1855.*
- 29765, 29923. Two specimens of the last right upper premolar ; from the Hempstead beds of the Isle of Wight.  
*Hastings Collection. Purchased, 1855.*
29753. The greater portion of the left ramus of the mandible ; from the Hempstead beds of the Isle of Wight. This specimen

shows  $\overline{\text{pm. 4}}$ , part of  $\overline{\text{m. 2}}$ , and  $\overline{\text{m. 3}}$ ; and agrees very closely with the immature mandible figured by Filhol, *op. cit.* pl. xxii. fig. 103, under the name of *Ancodus leptorhynchus*.  
*Hastings Collection. Purchased, 1855.*

- 29781.** Part of the right ramus of the mandible, showing the last two premolars and the three true molars; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

- 29802.** The mandible of a young individual, showing the last three milk-molars and the first true molar of both sides; from the Hempstead beds of the Isle of Wight. This specimen is considerably larger than the lower jaw of *H. velaunus* of the same age (No. 29784); the united lengths of  $\overline{\text{mm. 3}}$  and  $\overline{\text{mm. 4}}$  being 0,042 as against 0,034.

*Hastings Collection. Purchased, 1855.*

- M. 1945.** Cast of the mandible of an immature female individual. The original is from the Lower Miocene of Ronzon; and is figured (reversed) by Filhol, *op. cit.* pl. xxi., under the name of *Ancodus aymardi*. *Presented by Dr. Kowalevsky.*

- M. 1943.** Part of the left ramus of the mandible, containing the last premolar and the three true molars; from the Lower Miocene of Ronzon. The length of the space occupied by the three true molars is 0,080, and the length of  $\overline{\text{m. 3}}$  0,041; the corresponding dimensions of specimens described by Filhol in the *Ann. Sci. Géol.* vol. xii. art. 3, pp. 156, 158, being 0,048 and 0,039. *Presented by Dr. Kowalevsky.*

- 29754.** The third left lower true molar; from the Hempstead beds of the Isle of Wight. The length of this tooth is 0,044.

*Hastings Collection. Purchased, 1855.*

- 29839.** Part of the left ramus of the mandible, containing the second true molar; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

- 29846.** Part of the right ramus of the mandible, containing  $\overline{\text{pm. 4}}$  and  $\overline{\text{m. 1}}$ ; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

- 29763.** Fragment of the left ramus of the mandible, containing  $\overline{\text{m. 1}}$  and  $\overline{\text{m. 2}}$ ; from the Hempstead beds of the Isle of Wight. The specific reference of this specimen is provisional.

*Hastings Collection. Purchased, 1855.*

- 29776.** The fourth left lower premolar; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

- 29906.** Numerous incisors belonging to this or the preceding species; from the Hempstead beds of the Isle of Wight. (Fig.) Some of these specimens are figured by Owen, *op. cit.* pl. vii. figs. 10, 12, 13, 15, 18, 23.

*Hastings Collection. Purchased, 1855.*

### ***Hyopotamus americanus*, Leidy<sup>1</sup>.**

This is a hypsodont form, with upper molars very like those of the last species.

*Hab.* N. America.

- 47502.** Cast of a fragment of the right maxilla, containing m. 2 and m. 3, the latter unworn. The original is from the "Mauvaises Terres" of Dakota; and is figured in Journ. Ac. Nat. Sci. Philad. ser. 2, vol. vii. pl. xxi. fig. 1.

*Presented by Prof. J. Leidy, 1876.*

### ***Hyopotamus porcinus*, P. Gervais<sup>2</sup>.**

This species is somewhat smaller than *Anthracotherium minus*, and its upper molar teeth are of a brachydont type, and, as observed by Gervais, intermediate in structure between those of the typical *A. magnum* and the typical hypsodont *Hyopotamus velaunus*. The lower molars provisionally referred to this species present no distinctive differences from those of *Anthracotherium*; and this species therefore affords additional evidence of the real unity of *Hyopotamus* and *Anthracotherium*.

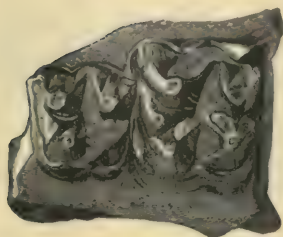
*Hab.* Europe.

- 29842.** Fragment of the left maxilla, containing the first and second (Fig.) upper true molars; from the Hempstead beds (Lower Miocene) of the Isle of Wight. The teeth of this specimen (which are figured in the accompanying woodcut, fig. 31) agree so exactly with the two type teeth figured by P. Gervais (*loc. cit.* 2nd ed. pl. xxxi. fig. 8) that there is every probability of the specific identity of the two; and, in the absence of any evidence to the contrary, they may be associated. The dimensions of m. 1 are 0,014 × 0,015,

<sup>1</sup> Proc. Ac. Nat. Sci. Philad. vol. viii. p. 59 (1856; vol. dated 1857).

<sup>2</sup> Zool. et Pal. Française, 1st ed. vol. ii. Exp. No. 31, p. 1 (1848-52).

Fig. 31.



*Hyopotamus porcinus*.—First and second left upper true molars; from the Hempstead beds of the Isle of Wight. 4.

and those of m. 2  $0,0185 \times 0,020$ . These dimensions are slightly larger than those of the two teeth figured by Gervais and regarded as m. 1 and m. 2; but it is quite probable that they are really mm. 4 and m. 1. The present teeth are readily distinguished from those of *H. bovinus* by their inferior size, and their lower cusps, shallower hollows, and the slighter concavity of the outer surface of the outer columns. They are really intermediate between the molars of *H. bovinus* and *A. alsaticum* (No. M. 1389); but are, on the whole, nearest to the former.

*Hastings Collection. Purchased, 1855.*

29793. The second right upper true molar; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

29897. The third right upper true molar; from the Hempstead beds of the Isle of Wight. The dimensions are  $0,020 \times 0,024$ .

*Hastings Collection. Purchased, 1855.*

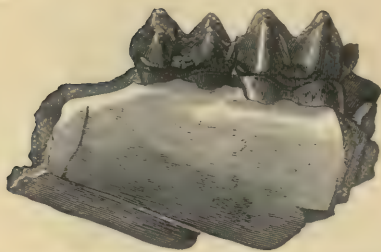
29773. Fragment of the left maxilla, containing mm. 4, m. 1, and m. 2, in an unworn but somewhat broken condition; from the Hempstead beds of the Isle of Wight. The dimensions of mm. 4 are  $0,0118 \times 0,012$ .

*Hastings Collection. Purchased, 1855.*

40209. Fragment of the left ramus of the mandible, containing (*Fig.*) m. 1 and m. 2; from the Hempstead beds of the Isle of Wight. This specimen (woodcut, fig. 32) is referred to the present species on account of the agreement in the size and structure of the teeth. The teeth are readily



Fig. 32.



*Hypotamus porcinus*.—The first and second left lower true molars; from the Hempstead beds of the Isle of Wight. †.

distinguished from those of *H. bovinus* by their smaller size and much lower cusps; they are considerably smaller than the teeth from the same locality provisionally referred to *Anthracotherium minus* (*infra*, p. 242), but agree very closely in general characters, though the cusps are perhaps slightly higher; they present no characters by which they can be generically distinguished from *Anthracotherium*. The dimensions of  $\overline{m. 1}$  are  $0,0136 \times 0,0095$ ; and those of  $\overline{m. 2}$   $0,0163 \times 0,0114$ .

*Hastings Collection. Purchased, 1855.*

**36812 b.** Fragment of the left ramus of the mandible, containing  $\overline{m. 3}$  in an early condition of wear; from the Hempstead beds of the Isle of Wight. The length of this tooth is 0,0255. *Presented by S. Laing, Esq., 1862.*

**36812 c.** The third right lower true molar, in an unworn condition and wanting the third lobe; from the Hempstead beds of the Isle of Wight. *Presented by S. Laing, Esq., 1862.*

**40209 a.** Fragment of the left ramus of the mandible, containing  $\overline{m. 2}$  and  $\overline{m. 3}$ , in a much-worn condition; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

*Limb-bones of Anthracotheriidae from the Hempstead beds of the Isle of Wight.*

It is probable that the majority of these bones belong to *Hypotamus*, and the larger specimens to *H. bovinus*. In the presence, however, of two genera and several species of *Anthracotheriidae* in the Hempstead beds, it appears unadvisable in many cases to make any definite specific references.

30176. The glenoidal extremity of the scapula of a large form  
(? *H. bovinus*). *Hastings Collection. Purchased, 1855.*
29977. The distal extremity of the left humerus of a large form  
(? *H. bovinus*). *Hastings Collection. Purchased, 1855.*
30116. The distal extremity of the left humerus of a rather smaller  
form. *Hastings Collection. Purchased, 1855.*
29974. The distal extremity of the left humerus, very similar to  
the last. *Hastings Collection. Purchased, 1855.*
29975. The lower half of the left humerus of a still smaller form  
(? *H. porcinus*). *Hastings Collection. Purchased, 1855.*
30161. The distal extremity of the left humerus.  
*Hastings Collection. Purchased, 1855.*
30023. The proximal extremity of the ulna of a large form.  
*Hastings Collection. Purchased, 1855.*
- 29984, 30096. The proximal and distal extremities of the radius.  
(*Fig.*) Figured by Kowalevsky in the *Phil. Trans.* for 1873,  
pl. xxxvi. fig. 3. *Hastings Collection. Purchased, 1855.*
29991. The lunar of a large form.  
*Hastings Collection. Purchased, 1855.*
30063. Portion of the right innominate of a large form.  
*Hastings Collection. Purchased, 1855.*
30046. The acetabulum of a large form.  
*Hastings Collection. Purchased, 1855.*
30012. The proximal extremity of the femur of a large form.  
*Hastings Collection. Purchased, 1855.*
30127. The proximal portion of the right femur. Figured by  
Kowalevsky in the *Phil. Trans.* for 1873, pl. xxxvi. fig. 6.  
*Hastings Collection. Purchased, 1855.*
30044. The distal extremity of the left femur of a large form  
(? *H. bovinus*). This specimen is very similar to one  
figured by Kowalevsky in the *Phil. Trans.* for 1873,  
pl. xxxv. fig. 2. *Hastings Collection. Purchased, 1855.*
29969. The distal half of the left femur, slightly smaller than the  
last and somewhat crushed.  
*Hastings Collection. Purchased, 1855.*

30048. The proximal extremity of the right tibia of a small form.  
*Hastings Collection. Purchased, 1855.*
30140. The proximal epiphysis of the right tibia of a very large form, corresponding in size to the femur No. 30044.  
*Hastings Collection. Purchased, 1855.*
29816. The distal two thirds of the right tibia, corresponding in size to No. 30048. *Hastings Collection. Purchased, 1855.*
- 36812 a. The distal half of the right tibia, corresponding in size with the last. *Presented by S. Laing, Esq., 1862.*
29968. The extremity of the left tibia, rather larger than the last. *Hastings Collection. Purchased, 1855.*
29937. The distal extremity of the left tibia, agreeing with the last. *Hastings Collection. Purchased, 1855.*
- M. 2186. A metapodial. *Purchased, 1855.*
- 29821, 29823, 29830, 29832, 29938. Numerous specimens of the astragalus of a large form.  
*Hastings Collection. Purchased, 1855.*
- 29825, 29826, 29829, 29939. Four specimens of the astragalus of a smaller form. *Hastings Collection. Purchased, 1855.*
29940. Two specimens of the astragalus of a still smaller form.  
*Hastings Collection. Purchased, 1855.*
29932. The cuboid of a large form (? *H. bovinus*).  
*Hastings Collection. Purchased, 1855.*
- 29926, 29928. Three specimens of the navicular of a large form (? *H. bovinus*). *Hastings Collection. Purchased, 1855.*
- 29929, 30120. Four specimens of the navicular of a smaller form.  
*Hastings Collection. Purchased, 1855.*
- 30112 &c. &c. Numerous specimens of phalangeals belonging to the proximal row. *Hastings Collection. Purchased, 1855.*
- 29954 &c. &c. Numerous specimens of phalangeals belonging to the second row. *Hastings Collection. Purchased, 1855.*
29920. A terminal phalangeal of the third or fourth digit.  
*Hastings Collection. Purchased, 1855.*

- 30341, 30344. Three terminal phalangeals provisionally referred to the present genus.

*Hastings Collection. Purchased, 1855.*

30051. The broken atlas vertebra of a large form. The form of the cavity for the reception of the odontoid process of the axis shows that this must have been peg-shaped, as in the present family. The facets for articulation with the centrum of the axis seem, however, to be placed in a plane too nearly transverse to the long axis of the bone for the specimen to have belonged to the same species as the axis vertebra noticed below.

*Hastings Collection. Purchased, 1855.*

29960. The centrum of the axis vertebra of a large form (? *H. bovinus*).

*Hastings Collection. Purchased, 1855.*

- 29960 a. The centrum of the axis vertebra of a smaller form.

*Hastings Collection. Purchased, 1855.*

30074. A dorsal vertebra of a large form.

*Hastings Collection. Purchased, 1855.*

30169. The first sacral vertebra of a large form.

*Hastings Collection. Purchased, 1855.*

### ***Hyopotamus picteti*, Lydekker<sup>1</sup>.**

Syn. *Hyopotamus gresslyi*, Pictet<sup>2</sup>.

The upper true molar of this small species precisely resembles those of the much larger *H. porcinus*; the penultimate upper premolar is of a narrow elongated type, approaching that of *Xiphodon*. The type maxilla is figured by Pictet (*loc. cit.*) under the name of *Hyopotamus gresslyi* (Meyer); but its distinction from that species has been indicated by the present writer (*loc. cit.*).

*Hab.* Switzerland.

- M. 2184. Three detached upper true molars; from the Upper Eocene (Bohnerz) of Switzerland. These teeth agree precisely with those of the type specimen figured by Pictet. The deep concavity of the outer surface of the external columns, and the marked loop connecting those columns,

<sup>1</sup> Geol. Mag. dec. 3, vol. ii. p. 131 (1885).

<sup>2</sup> Matériaux pour la Paléontologie Suisse, vol. i. Vertébrés de la Faune Eocène, Supplément, pl. xxiv. fig. 5 (1869).



at once distinguishes the specimens from *Anthracotherium gresslyi*<sup>1</sup> (No. 29851). The length of the outer border of the largest tooth is 0,010. *Purchased, 1885.*

***Hyopotamus giganteus*, Lydekker<sup>2</sup>.**

This is a brachydont form, and the largest described species; it closely approaches *Anthracotherium hyopotamoides* in the structure of its molars.

*Hab.* North-west frontier of India.

- M. 1542.** Cast of the third left upper true molar. The original is from the Lower Siwaliks of the Búgti Hills, on the north-west frontier of India; and is described and figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. p. 160, pl. xxiv. fig. 3. A similar specimen from the same locality is figured in the accompanying woodcut

Fig. 33.



*Hyopotamus giganteus*.—The third left upper true molar; from the Búgti Hills. †. Indian Museum, Calcutta. (From the 'Palæontologia Indica.')

(fig. 33), and is likewise preserved in the Indian Museum, Calcutta.

*Presented by the Superintendent of the Geological Survey of India, 1883.*

- M. 1541.** Cast of a portion of the right ramus of a mandible provisionally referred to the present species. The original is

<sup>1</sup> *Infrà*, p. 244.

<sup>2</sup> *Palæontologia Indica* (Mem. Geol. Surv. Ind.), ser. 10, vol. ii. p. 160 (1883).

from Dera Búgti, and is preserved in the Indian Museum, Calcutta. It is described and figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. p. 163, pl. xxv. fig. 2.

*Presented by the Superintendent of the Geological Survey of India, 1883.*

Genus **ANTHRACOTHERIUM**, Cuvier<sup>1</sup>.

Syn. *Tapinodon*, H. v. Meyer<sup>2</sup>.

**Anthracotherium hyopotamoides**, Lydekker<sup>3</sup>.

This species is intermediate in size between *A. magnum* and *A. alsaticum*. The outer cusps of the upper molars are connected by a more distinct loop than in other species, thus showing a great resemblance to the brachydont forms of *Hyopotamus*.

*Hab.* North-west frontier of India.

**M. 1544.** Cast of the hinder portion of the right maxilla, showing m. 3, and the base of m. 2. The original is from the Lower Siwaliks of the Búgti Hills, on the north-west frontier of India, and is preserved in the Indian Museum, Calcutta; it is described and figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. p. 153, pl. xxiv. fig. 2.

*Presented by the Superintendent of the Geological Survey of India, 1883.*

**M. 1545.** Cast of a fragment of the right ramus of a mandible, provisionally assigned to the present species. The history of the original of this specimen is the same as the last. It is figured in pl. xxv. fig. 1 of the memoir cited.

*Presented by the Superintendent of the Geological Survey of India, 1883.*

**M. 1546.** Cast of a fragment of the right ramus of a mandible similar to the last. The history of the original of this

<sup>1</sup> Ossements Fossiles, 2nd ed. vol. iii. p. 396 (1822). A synopsis of the species is given by Teller in the Beitr. Pal. Ost.-Ung. vol. iv. part I (1884). Meyer's *A. dalmatinum* is there referred to the new genus, *Prominatherium*.

<sup>2</sup> Neues Jahrb. 1846, p. 471.

<sup>3</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. ii. p. 152 (1883).

specimen is the same as the last. It is figured in pl. xxv. fig. 3 of the memoir cited.

*Presented by the Superintendent of the  
Geological Survey of India, 1883.*

### **Anthracotherium magnum, Cuvier<sup>1</sup>.**

Three very large species of Anthracotheres have been described, viz.:—*A. magnum*, typically, from the Lower Miocene of Cadibona, Italy; *A. valdense*, Kowalevsky<sup>2</sup>, from the Lower Miocene lignites of Rochette, near Lausanne, Switzerland; and *A. illyricum*, Teller<sup>3</sup>, from the Miocene lignites of South Styria. The second species is considerably larger than most individuals of the typical Cadibona form of *A. magnum*; and is also distinguished by the presence of a small talon behind the third lobe of  $\overline{m.3}$ , by a difference in the inclination of the incisors, and in the proportion of the skeleton, as well as by the apparent absence of a projection on the inferior border of the outer side of the mandible. The third species is also somewhat larger than the typical form of *A. magnum*, from which it differs by the excessive shortness of the antero-posterior diameter of  $m.1$ , as well as by differences in cranial characters, the form of the cranium being strikingly like that of *Hippopotamus*. It does not appear that the later upper molars of these three species present any very well-marked distinctive characters beyond differences in size, although differences are noticed in *A. illyricum*. A large Anthracothere occurs in the Quercy phosphorites, which Kowalevsky was inclined to consider as distinct, both from *A. magnum* and *A. valdense*; and its first upper true molar is quite different from that of *A. illyricum*. Filhol<sup>4</sup>, however, refers the Quercy form to *A. magnum*; and this view is provisionally adopted here, although the question cannot be considered settled until a complete cranium be obtained. Some of the molars of the Quercy form agree very nearly in size with those of the largest specimens of the typical *A. magnum*; and since there is such a variation in the size of the teeth from Cadibona referred to that species, no distinction on this ground can apparently be drawn between the Cadibona and Quercy forms; and it

<sup>1</sup> Ossements Fossiles, 2nd ed. vol. iii. p. 398 (1822). *Grande Espèce d'Anthracotherium*.

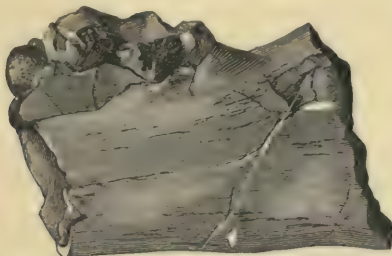
<sup>2</sup> Palæontographica, vol. xxii. p. 338 (1874; vol. dated 1876). Plate xii. is lettered *A. magnum*. The plates are reproduced by Renevier in the Bull. Soc. Vaud. Sci. Nat. sér. 2, vol. xvi. p. 140 (1879).

<sup>3</sup> Beitr. Pal. Ost.-Ung. vol. iv. pt. 1, p. 63 (1884).

<sup>4</sup> Ann. Sci. Géol. vol. viii. art. 1, p. 174 (1877).

seems, moreover, that *A. magnum* passes imperceptibly in the other direction into the smaller *A. alsaticum*<sup>1</sup>. The fragment of the mandible of a large Anthracothere figured in the accompanying woodcut (fig. 34) was obtained from the Lower Siwaliks of Dera

Fig. 34.



*Anthracotherium*, sp. — Part of the left ramus of the mandible; from Dera Búgti. Indian Museum.  $\frac{1}{3}$ . (From the 'Palæontologia Indica'.)

Búgti, on the north-west frontier of India, and is very similar to *A. magnum*, although insufficient for specific determination. It is described in the 'Palæontologia Indica,' ser. 10, vol. ii. p. 176.

*Hab.* Europe.

**28770.** The palate, with the complete dentition, except the inner pair of incisors; from the Lower Miocene of Ufhofen, near Flonheim, Hesse Darmstadt. This magnificent specimen is noticed by P. Gervais in the Zool. et Pal. Françaises, 2nd ed. p. 190. It agrees precisely with the typical Cadi-bona form, of which a palate is figured by Gastaldi in the Mem. R. Ac. Sci. Turin, ser. 2, vol. xix. pl. ix. (1858).

*Purchased*, 1853.

**M. 1433.** The crown of the last upper true molar, in an unworn condition; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen, like others from the phosphorites, is of very large size, its length being 0,059, and its greatest width 0,063.

*Purchased*, 1884.

**M. 1433 a.** The last right upper true molar, in a partially worn condition; from the Upper Eocene of Caylux.

*Purchased*, 1884.

**M. 1434.** Two last left upper true molars, in a middle condition of wear; from the Upper Eocene of Caylux.

*Purchased*, 1884.

<sup>1</sup> Ann. Sci. Géol. vol. viii. art. 1. p. 175.



- M. 1435.** The first or second left upper true molar, in a well-worn condition ; from the Upper Eocene of Caylux. *Purchased, 1884.*
- M. 1436.** Fragment of the right maxilla, containing the last premolar and the greater part of the first true molar ; from the Upper Eocene of Caylux. *Purchased, 1884.*
- M. 1437.** The right premaxilla, containing the second and third incisors and the alveolus of the first tooth of the same series ; from the Upper Eocene of Caylux. The teeth of this specimen agree in general characters with those of the Ufhofen cranium, No. 28770. *Purchased, 1884.*
- M. 1132.** Cast of the complete mandible. The original is from the Lower Miocene of Puy-de-Dôme, France, and is figured by Blainville in the 'Ostéographie,' genus *Anthracotherium*, pl. i. (d'Auvergne), and noticed by Gervais, *op. cit.* p. 189. *Croizet Collection. Purchased, 1848.*
- 197 (O. C.).** Cast of a fragment of the right ramus of the mandible, with the penultimate and last true molars. The original is from the Lower Miocene lignites of Cadibona (Piedmont), Italy ; and is described and figured by Cuvier in the 'Ossements Fossiles,' 2nd ed. vol. iii. p. 398, pl. lxxx. fig. 2 (1822). *No history.*
- M. 75 b.** Two fragments of the mandible, one containing portions of the penultimate and last true molars ; from the Lower Miocene of Cadibona. *Purchased, 1880.*
- M. 1447.** Portion of the right ramus of the mandible, containing the last premolar and the first and second true molars, in a well-worn condition ; from the Upper Eocene of Caylux. The teeth are considerably larger than those of the foregoing specimens of the Cadibona race. *Purchased, 1884.*
- M. 1451.** A right lower true molar, in a slightly worn condition ; from the Upper Eocene of Caylux. *Purchased, 1884.*
- M. 1443, M. 1446, M. 1453.** Detached incisor, canine, and premolar teeth, probably belonging to the present species ; from the Upper Eocene of Caylux. *Purchased, 1884.*

***Anthracotherium alsaticum*, Cuvier<sup>1</sup>.**

This smaller species was founded on the lower jaw of a young individual from the Lower Miocene of Alsace, which P. Gervais<sup>2</sup> and De Blainville thought might be included in *A. magnum*. Subsequently the palate of an *Anthracotherium* from the Upper-Eocene phosphorites of France was described and figured by P. Gervais<sup>3</sup>, who thought that it might be referred either to *A. alsaticum* or *A. cuvieri* (= *A. onoideum*), both of which he speaks of as races of *A. magnum*. Another palate has been described and figured by Filhol<sup>4</sup> from the same formation, which, from its association with a mandible having an external projection (wanting in *A. cuvieri*), he thought might be referred to the present species. He shows, however, that there is a transition in respect of size between the smaller form and *A. magnum*; so that it seems rather a question of races than species. Teller<sup>5</sup> is somewhat doubtful of this identification; but one of the specimens noticed below (No. M. 2177) indicates its correctness. There seems, indeed, no possible means of distinguishing between the upper dentition of *A. alsaticum* and *A. cuvieri*; the latter species being distinguished merely by the form of the mandible. Under these circumstances the course here followed has been to provisionally refer all the European specimens of *Anthracotherium*, not showing the characteristic part of the mandible, which are decidedly smaller than the typical *A. magnum*, and yet larger than *A. minus*, to the present species or race. In the palate figured by Filhol the upper premolars are in contact, but are separate in the one figured by Gervais.

*Hab.* Europe.

**M. 1389.** The first left upper true molar; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen agrees in size with the corresponding tooth in the palates figured by Filhol and Gervais. *Purchased, 1884.*

**M. 2176.** Fragment of the right maxilla, containing the last three premolars; from the Upper Eocene of Caylux. This specimen agrees precisely with the corresponding portion of the palate figured by Filhol. *Purchased, 1885.*

<sup>1</sup> Ossements Fossiles, 2nd ed. vol. iv. p. 500 (1822).

<sup>2</sup> Zool. et Pal. Françaises, 2nd ed. p. 189.

<sup>3</sup> Zool. et Pal. Générales, sér. 2, p. 47, pl. x. fig. 1 (1876).

<sup>4</sup> Ann. Sci. Géol. vol. viii. art. 1, pp. 175-178, pl. viii. fig. 241 (1877).

<sup>5</sup> Beitr. Pal. Ost.-Ung. vol. iv. pt. 1, p. 57 (1884).

**M. 1432.** The second left upper true molar ; from the Upper Eocene of Caylux. *Purchased, 1884.*

**M. 75.** Fragment of the left maxilla, containing portions of m. 1 and m. 2 ; from the Lower Miocene of Cadibona (Piedmont), Italy. The teeth of this specimen agree precisely with those of the palate figured by P. Gervais (*op. cit.*).  
*Purchased, 1880.*

**M. 75 a.** Fragment of the right maxilla, containing the first true molar, which agrees precisely with the corresponding tooth of the last specimen ; from the Lower Miocene of Cadibona.  
*Purchased, 1880.*

**29593.** Small fragment of the right maxilla<sup>1</sup>, containing m. 3 and the outer half of m. 2 ; from the Lower Miocene of Cadibona. The teeth of this specimen agree in relative size with those of M. 75 ; and it is probable that both belong to the same species, whatever that species may really be. The length of m. 3 is 0,043, which agrees with the smallest form referred by Gastaldi to *A. magnum*.  
*Presented by the Earl of Enniskillen, 1855.*

**11963.** Cast of the symphysis and part of the right ramus of the mandible, containing mm. 2, mm. 3, mm. 4, and mm. 1. The original is the type specimen, and was obtained from the Lower Miocene<sup>2</sup> of Lobsann, in Alsace. It is figured by Cuvier in the 'Ossements Fossiles,' 2nd ed. vol. iv. pl. xxxix. fig. 5, and by De Blainville in the 'Ostéographie,' Genus *Anthracotherium*, pl. iii.

*Mantell Collection. Purchased, 1836.*

**M. 2177.** Fragment of the left ramus of the mandible of a young individual, showing mm. 4 and m. 1 ; from the Upper Eocene of Caylux. The teeth of this specimen agree precisely with those of the last. The length of m. 1 is 0,028.

*Purchased, 1885.*

**29907.** The third right upper incisor of an *Anthracotherium* ; from the Hempstead beds (Lower Miocene) of the Isle of Wight.

<sup>1</sup> This specimen has been hitherto referred to *A. cuvieri* (but without any sufficient reason), and is so noticed by the present writer in the 'Paleontologia Indica,' ser. 10, vol. ii. pp. 151, 153. The form of the loop connecting the two columns, noticed on the latter page, appears to be due merely to wear.

<sup>2</sup> Teller (*op. cit.* p. 57) correlates these beds with the Hempstead beds.

This specimen is noticed by the present writer in the Geol. Mag. dec. iii. vol. i. p. 548 (1884). It is slightly smaller than the corresponding tooth in the Ufhofen palate of *A. magnum* (No. 28770), and would therefore agree well in size with the present species, the type of which was obtained from beds referred to the horizon of the Hempstead beds. The present specimen is apparently too large to have belonged to *A. minus*. The height of the crown (of which the summit is abraded) is 0,025, the antero-posterior diameter of the base of the crown 0,020, and the transverse 0,017. *Hastings Collection. Purchased, 1855.*

- 29907 a. Cast of the second left upper incisor; from the Lower Miocene of Buchsweiler (Bas-Rhin), Alsace.

*Egerton Collection. Purchased, 1882.*

- M. 2224. A right fourth metatarsal, provisionally referred to this species; from the Upper Eocene of Caylux. This specimen agrees very closely with the one figured by Kowalevsky in the 'Palæontographica,' vol. xxii. pl. xi. fig. 55. The corresponding bone of *Elotherium* (*vide* Filhol, Ann. Sci. Géol. vol. xii. pl. xxviii. fig. 147) differs by the absence of the median ridge on the anterior aspect of the distal trochlea. *Purchased, 1885.*

### ***Anthracotherium valdense*, Kowalevsky<sup>1</sup>.**

*Hab.* Switzerland.

- M. 1949. The associated second and third right upper true molars of a large *Anthracotherium*; probably from the Lower-Miocene lignites of Rochette, near Lausanne, Switzerland. If the locality be correct, these specimens probably belong to *A. valdense*. The summits of the teeth are but very slightly touched by wear; and m. 3 is remarkable for its great width. The length of the latter tooth is 0,055, and its greatest width 0.075. *Presented by Dr. Kowalevsky.*

- M. 1950. Fragment of a ramus of the mandible, with the broken premolar and canine; probably obtained from the same locality as the preceding, and belonging to the same species. *Presented by Dr. Kowalevsky.*

<sup>1</sup> Palæontographica, vol. xxii. p. 338 (1874; vol. dated 1876).



**Anthracotherium minus**, *from the Upper Eocene*  
*Purchased, 1884.*

The lower molar teeth of this form are said to be rather half the size of those of the typical Cadibona form of *A. magnum*, and have more distinct cusps. Specimens from Rochette figured by Kowalevsky ('Palæontographica,' vol. xxii. pl. xii. figs. 72 & 73) are referred to this species by Renevier in the Bull. Soc. Vaud. Sci. Nat. sér. 2, vol. xvi. (1879). The reference of the following specimens is provisional.

*Hab.* Europe.

29803. Fragment of the right ramus of the mandible of a small *Anthracotherium*; from the Hempstead beds (Lower Miocene) of the Isle of Wight. This specimen contains  $\overline{m. 2}$  and the greater part of  $\overline{m. 3}$ ; the length of the former being 0.018, which is somewhat greater than that of the corresponding tooth of the specimen figured by Kowalevsky. It is not improbable that this specimen (which is noticed by the present writer in the Geol. Mag. dec. 3, vol. i. p. 548 [1884]) may belong to the present species.

*Hastings Collection. Purchased, 1855.*

29804. The greater part of a third right lower true molar, similar to the last; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

29900. The first left lower true molar; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

- 29900 a. The third right lower true molar, wanting the third lobe; from the Hempstead beds of the Isle of Wight.

*Hastings Collection. Purchased, 1855.*

- 36812 d. The second left lower true molar; from the Hempstead beds of the Isle of Wight.

*Presented by S. Laing, Esq., 1862.*

**Anthracotherium, sp. a.**

(Cf. *A. laharpei*, Renevier<sup>2</sup>.)

*Hab.* Europe.

26809. Two associated upper molars (one imperfect); from the Lower Miocene of Puy-de-Dôme, France. The smallest tooth

<sup>1</sup> Ossements Fossiles, 2nd ed. vol. iii. p. 403 (1822).

<sup>2</sup> Bull. Soc. Vaud. Sci. Nat. sér. 2, vol. xvi. p. 146 (1879).

This specimen is 215, and a width of 0,023. The teeth are Mag. than those of the last species; and apparently closely resemble teeth from Rochette, near Lausanne, Switzerland, figured by Kowalevsky in the 'Palæontographica,' vol. xxii. pl. xxii. fig. 76, and subsequently named by E. Renevier (*loc. cit.*) *A. laharpei*.

*Pomel Collection. Purchased, 1851.*

***Anthracotherium silistrense*, Pentland<sup>1</sup>.**

Syn. *A. punjabiense*, Lydekker<sup>2</sup>.

This is a small species, nearly of the size of *A. breviceps* (Troschel).

*Hab.* India.

**19041.** The right upper true molar, in a partially worn condition; (*Fig.*) from the Siwaliks of Káribári, Gáro Hills, N.E. Bengal, India. This is the type specimen, and is figured by J. B. Pentland in the Trans. Geol. Soc. ser. 2, vol. ii. pl. xlv. figs. 4, 5, and by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxviii. figs. 23, 23a. It precisely resembles a specimen from Sind figured by the present writer in the 'Palæontologia Indica,'<sup>3</sup> ser. 10, vol. ii. pl. xxiii. fig. 10.

*Collected by Sir J. Colebrooke. Before 1828.*

**39881.** A penultimate upper milk-molar, very probably belonging to (*Fig.*) the present species; from the Pliocene of the Kalawála Pass in the Siwalik Hills. This specimen is figured in Royle's 'Botany &c. of the Himalaya Mountains,' pl. iii. figs. 12-15 (1839). *Cautley Collection. Presented, 1842.*

**M. 1543.** Cast of the hinder part of the right ramus of the mandible. The original is from the Siwaliks of the Punjab, India, and is preserved in the Indian Museum, Calcutta. It is described and figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. ii. p. 151, pl. xxiv. figs. 1, 1a.

*Presented by the Superintendent of the Geological Survey of India, 1883.*

<sup>1</sup> Trans. Geol. Soc. ser. 2, vol. ii. p. 394 (1828), *in parte*.

<sup>2</sup> Rec. Geol. Surv. Ind. vol. x. p. 78 (1877).

<sup>3</sup> When describing the latter the type specimen could not be found.

**Anthracotherium, sp. b.***Hab.* India.

15712. Fragment of the right ramus of the mandible, containing  $\overline{m. 1}$ ,  $\overline{m. 2}$ , and the alveolus of  $\overline{pm. 4}$ ; from the Pliocene of the Siwalik Hills, India. The length of  $\overline{m. 1}$  is 0,016, and that of  $\overline{m. 2}$ , 0,019. The specimen is much smaller than the mandible referred to *A. hyopotamoides*, and considerably larger than that referred to *A. silistrense*. The teeth agree very nearly in size with those of the mandible from the Isle of Wight (No. 29803) provisionally referred to *A. minus*, but the form of the columns is different.

*Cautley Collection. Presented, 1842.***Anthracotherium, sp. c.***Hab.* India.

19042. The third left lower true molar; from the Pliocene of the Siwalik Hills, India. This specimen is relatively smaller than the teeth of the preceding specimen; and is larger than  $\overline{m. 3}$  of *A. silistrense* (No. M. 1543), its length being 0,027 instead of 0,023.

*Cautley Collection. Presented, 1842.***Anthracotherium gresslyi** (H. von Meyer<sup>1</sup>).*Syn. Tapinodon gresslyi*, Meyer<sup>2</sup>.*Hyopotamus gresslyi*, Rüttimeyer<sup>3</sup>.

This species has been referred to the present genus by the writer in the 'Geological Magazine,' dec. 3, vol. ii. p. 69 (1885). It is the smallest described form; and differs from the other species of which the complete dentition is known by the long diastema between the first and second upper premolars, and by the absence of the first lower premolar. It must be regarded as a highly specialized form of the genus, presenting the same relation to the typical forms as is borne by *Cænotherium cadurcense* and its allies to *Cænotherium commune*, and by *Xiphodon secundarius* to *Xiphodon gracilis*. The type specimens are from the siderolithes (Upper Eocene) of Egerkingen, Switzerland.

*Hab.* Europe.<sup>1</sup> Neues Jahrb. 1846, p. 471, *Tapinodon*.<sup>2</sup> *Loc. cit.*<sup>3</sup> Denkschr. schw. Ges. Nat. vol. xix. art. 3, p. 70 (1862).

has a mium, in a much-crushed condition; from the Headon beds (Upper Eocene) of Hordwell, Hampshire. This specimen has been described and figured by the present writer in the 'Geological Magazine,' *loc. cit.* It shows the cheek-dentition of both sides, although *pm. 1* is wanting on the right side. The dentition of the left side is represented in the accompanying woodcut (fig. 35). The detached first

Fig. 35.



*Anthracotherium gresslyi* (Meyer).—The left half of the palate and the upper cheek-dentition; from the Headon beds of Hordwell. †.

premolar is inserted by two distinct fangs, and was probably approximated to the canine. The last six cheek-teeth agree with those of typical species of the genus; the three true molars are in a well-worn condition. The anterior border of the posterior nares is situated a considerable distance behind the last molar. The height from the lower border of the foramen magnum to the summit of the occiput is 0,034. The length from the lower border of the foramen magnum to *pm. 1* is 0,117; the length of the space occupied by the last six cheek-teeth 0,047; that by the three true molars 0,0265; the length of the diastema between *pm. 1* and *pm. 2* 0,0205; the length of *m. 3* 0,0095, and its width 0,012.

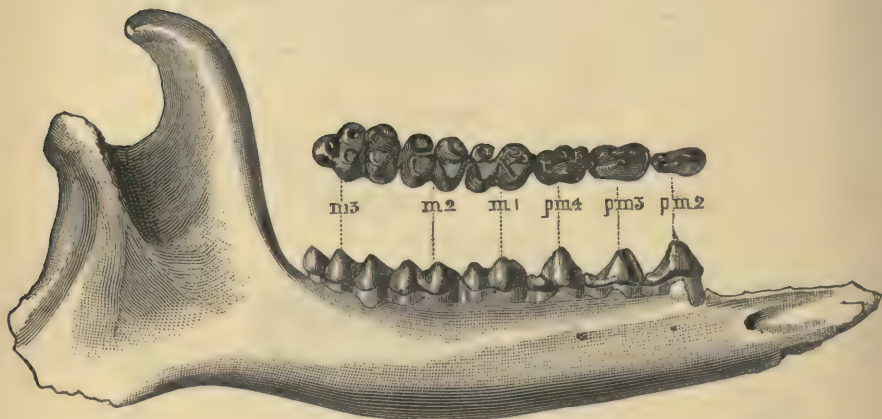
*Hastings Collection. Purchased, 1855.*

- 29713.** The mandible, probably belonging to the same individual as the last specimen; from the Headon beds of Hordwell. (*Fig.*) This specimen, of which the right ramus and the dentition are represented in the accompanying woodcut (fig. 36), is



described and figured by the present writer in the 'Geological Magazine,' *loc. cit.* The figured ramus is complete,

Fig. 36.



*Anthracotherium gresslyi* (Meyer).—The right ramus of the mandible, and the lower cheek-dentition; from the Headon beds of Hordwell.  $\frac{1}{2}$ .

with the exception of the symphysis, and shows six cheek-teeth in apposition, in advance of which there is a long diastema, followed by the broken base of the canine. The other ramus shows the six cheek-teeth. The molars resemble those of *Anthracotherium*; each premolar is inserted by two fangs; and the fourth has a large inner cusp. There is no trace of  $\overline{\text{pm. 1}}$ . The extreme length is 0,114; the extreme height at the coronoid process 0,052; the depth at  $\overline{\text{m. 3}}$  0,017, at  $\overline{\text{pm. 2}}$  0,015; the length of the space occupied by the six cheek-teeth 0,052, that by the three true molars 0,030; that of  $\overline{\text{m. 1}}$  0,0085, of  $\overline{\text{m. 2}}$  0,0087, of  $\overline{\text{m. 3}}$  0,013; and the width of  $\overline{\text{m. 3}}$  0,008.

*Hastings Collection. Purchased, 1855.*

- 37333.** A left upper and a lower true molar belonging to the same or a closely allied species; from the Bembridge beds (Upper Eocene) of the Isle of Wight. The upper molar is slightly smaller than  $\overline{\text{m. 1}}$  of No. 29851.

*Presented by F. E. Edwards, Esq., 1863.*

**Anthracotherium, sp. d.***Hab.* England.

**29856.** The right ramus of a mandible, containing  $\overline{m. 2}$  and  $\overline{m. 3}$ , apparently belonging to the present genus; from the Headon beds (Upper Eocene) of Hordwell, Hampshire. The molars are larger, and the jaw is deeper than in *A. gresslyi*, but the structure of the teeth is very similar. The length of  $\overline{m. 3}$  is 0,014, and the depth of the jaw behind that tooth 0,026.

*Hastings Collection. Purchased, 1885.*

## Family CHÆROPOTAMIDÆ.

The true molars are intermediate in structure between those of *Anthracotherium* and the more generalized *Suidæ* like *Hyootherium*. Those of the upper jaw have five columns, arranged as in the *Anthracotheriidae*. *Chæropotamus steinheimensis*, Fraas (*vide Jahresh. Ver. Nat. Württ.* 1885, pl. v.), seems to belong to *Hyootherium*. *Cebochærus* is noticed in the Addenda.

Genus CHÆROPOTAMUS, Cuvier<sup>1</sup>.

*Dentition* :—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{3}$ , M.  $\frac{3}{3}$ . There is a third lobe to  $\overline{m. 3}$ .

**Chæropotamus gypсорum**, Desmarest<sup>2</sup>.*Syn. Chæropotamus cuvieri*, Owen<sup>3</sup>.*Chæropotamus parisiensis*, Blainville<sup>4</sup>.*Chæropotamus affinis*, P. Gervais<sup>5</sup>.

The upper true molars resemble those of *Anthracotherium silistrense*, but have shorter crowns, with a less approach to a selenodont structure.

*Hab.* Europe.

**30667.** Part of the right maxilla, showing the last four cheek-teeth in a worn and somewhat broken condition; from

<sup>1</sup> Ossements Fossiles, 2nd ed. vol. iii. p. 260 (1822), *Chæropotame*.<sup>2</sup> Mammalogie, p. 545 (1822).<sup>3</sup> Trans. Geol. Soc. ser. 2, vol. vi. p. 41 (1841 [read 1838]).<sup>4</sup> 'Ostéographie,' Genus *Chæropotamus*, pl. i. (1846).<sup>5</sup> Zool. et Pal. Françaises, 1st ed. vol. i. p. 95 (1848-52).

the Upper Eocene of Débruge, near Apt (Vaucluse), France. *Bravard Collection. Purchased, 1852.*

**26807.** Fragment of the left maxilla, showing the three true molars in a broken condition ; from the Upper Eocene of Débruge. *Pomel Collection. Purchased, 1851.*

**26808.** Fragment of the left maxilla, containing m. 3 in an unworn but broken condition ; from the Upper Eocene of Débruge. *Pomel Collection. Purchased, 1851.*

**30664.** Fragment of the left maxilla, with the unworn m. 1 or m. 2 ; from the Upper Eocene of Débruge. *Bravard Collection. Purchased, 1852.*

**M. 33.** The greater part of the right ramus of the mandible of a male, showing all the cheek-teeth except pm. 3, which has fallen from its alveolus ; from the Upper Eocene of Seafield, Isle of Wight. This specimen is figured by Owen in the Trans. Geol. Soc. ser 2, vol. vi. pl. iv. figs. 1, 2. The sex is inferred from the great thickness of the premolars. *Bequeathed by Rev. W. D. Fox, 1880.*

**30625.** The greater part of the right ramus of the mandible of a female (with the hinder part restored), showing the alveoli of the incisors, the broken canine, and the perfect series of six cheek-teeth ; from the Upper Eocene of Débruge. The cheek-teeth of this specimen are figured (reversed) by P. Gervais in the Zool. et Pal. Françaises, 2nd ed. pl. xxxi. fig. 5. The extremely small size of the canine and the narrow premolars indicate the female sex of this specimen. *Bravard Collection. Purchased, 1852.*

**M. 2195.** Hinder part of the left ramus of the mandible of a male, showing the last four cheek-teeth ; from the Upper Eocene of Vaucluse. *Purchased, 1885.*

**30626.** Part of the left ramus of the mandible, showing m. 2 and m. 3 in a half-worn condition ; from the Upper Eocene of Débruge. *Bravard Collection. Purchased, 1852.*

**30627.** Part of the left ramus of the mandible, containing pm. 3, pm. 4, and a part of m. 1, all well worn ; from the Upper Eocene of Vaucluse. *Bravard Collection. Purchased, 1852.*

**M. 2196.** Fragment of the left ramus of the mandible of a young individual, showing  $\overline{\text{mm. 4}}$ ,  $\overline{\text{m. 1}}$ , and  $\overline{\text{m. 2}}$ , in a slightly worn condition; from the Upper Eocene of Vacluse.

*Purchased, 1885.*

**M. 2197.** The fourth left lower milk-molar; from the Upper Eocene of Vacluse.

*Purchased, 1885.*

Genus **ELOTHERIUM**, Pomel<sup>1</sup>.

Syn. *Entelodon*, Aymard<sup>2</sup>.

*Archæotherium*, Leidy<sup>3</sup>.

*Oltinotherium*, Delfortrie<sup>4</sup>.

*Dentition*:—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ . There is no third lobe to  $\overline{\text{m. 3}}$ <sup>5</sup>, and the premolars are of moderate size, by which characters the genus is distinguished from *Tetraconodon*<sup>6</sup>. For *E. mortoni* see Addenda.

**Elotherium magnum**, Pomel<sup>7</sup>.

Syn. *Entelodon magnum*, Aymard<sup>8</sup>.

*Entelodon ronzonei*, Aymard<sup>9</sup>.

*Elotherium aymardi*, Pomel<sup>10</sup>.

*Elotherium ronzonei*, Pomel<sup>11</sup>.

*Oltinotherium verdeauri*, Delfortrie<sup>12</sup>.

*Hab.* Europe<sup>13</sup>. The Woodwardian Museum, Cambridge, possesses specimens from the Hempstead beds of the Isle of Wight.

**29630.** Cast of a portion of the right maxilla, showing the seven cheek-teeth. The original is in the Paris Museum, and was obtained from the Lower Miocene of Ronzon, near

<sup>1</sup> Bull. Soc. Géol. France, sér. 2, vol. iv. p. 1083 (1847). The usual reference to the Arch. Sci. Phys. Nat. of the same year is not the original one. In the 'Palæontologia Indica,' ser. 10, vol. iii. p. 99, the writer adopted the name *Entelodon*, but he now agrees with Flower in taking *Elotherium*.

<sup>2</sup> Ann. Soc. Agric. Sci. le Puy, vol. xii. p. 240 (1848), *teste* Filhol.

<sup>3</sup> Proc. Ac. Nat. Sci. Philad. vol. v. p. 92 (1850; vol. dated 1852).

<sup>4</sup> Act. Soc. Linn. Bordeaux, vol. xxix. p. 261 (1873).

<sup>5</sup> The only known Artiodactyle with this feature is the existing *Neotragus saltianus*.

<sup>6</sup> *Vide* 'Palæontologia Indica,' ser. 10, vol. i. pl. x.

<sup>7</sup> *Loc. cit.*

<sup>8</sup> *Ibid.*

<sup>9</sup> *Ibid.*

<sup>10</sup> Catalogue Méthodique, p. 89 (1853).

<sup>11</sup> *Loc. cit.*

<sup>12</sup> *Loc. cit.*

<sup>13</sup> Filhol (Ann. Sci. Géol. vol. xii. art. 3, p. 190) identifies four of Leidy's North-American species with *E. magnum*, but this is doubtful.



Puy-en-Velay (Haute-Loire), France. It is figured by P. Gervais in the *Zool. et Pal. Françaises*, 2nd ed. pl. xxxii. fig. 12 ( $\frac{2}{3}$ ), by Kowalevsky in the '*Palæontographica*,' vol. xxii. pl. xxv. fig. 7, and by Filhol in the *Ann. Sci. Géol.* vol. xii. pl. xxvii. fig. 138.

*Presented by the Paris Museum of Natural History.*

- 40956.** Cast of the mandible, showing portions of two premolars, and the three true molars, with the alveoli of the other teeth. The original was obtained from the Lower Miocene of Agen (Garonne), France. *Purchased, 1868.*

- M. 2194.** Cast of the last six left lower cheek-teeth. The original from which this cast is taken is more complete, and was obtained from the Lower Miocene of Ronzon; it is figured by Kowalevsky, *op. cit.* fig. 9, and by Filhol, *op. cit.* figs. 139, 140. *Presented by Dr. Kowalevsky.*

- M. 2392.** A lower incisor, provisionally referred to this species; from the Lower Miocene of Ronzon. *No history.*

- M. 2393.** Cast of the left lower canine and pm. 1, associated with the last, and represented in the two figures quoted. *Presented by Dr. Kowalevsky.*

- M. 2394.** Cast of the greater part of the right tibia, with the patella *in situ*. The original, which is considerably damaged, is from the Lower Miocene of Ronzon, and is described and figured by Kowalevsky, *op. cit.* p. 435, pl. xxvii. fig. 33. *Presented by Dr. Kowalevsky.*

### Family SUIDÆ.

There seems no possibility of drawing any distinction of more than generic value between *Dicotyles*, *Hyotherium* and its allies, and *Sus*, and they all are accordingly included in this family. The molars are bunodont, the upper ones having four main columns, which may be simple (*Hyotherium*), or of extreme complexity (*Hippohyus*); a secondary column corresponds to the fifth column of the *Anthrocotheriidae* and *Chaeropotamidae*.

#### Genus **DICOTYLES**, Cuvier<sup>1</sup>.

*Dentition*:—I.  $\frac{2}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{3}{3}$ , M.  $\frac{3}{3}$ . The upper premolars have the same structure as the true molars.

<sup>1</sup> *Règne Animal*, vol. i. p. 237 (1817).

***Dicotyles labiatus*, Cuvier<sup>1</sup>.**

Syn. *Dicotyles affinis labiatus*, Lund<sup>2</sup>.

The fossil specimens noticed below are somewhat larger than the corresponding parts of the skeleton of the existing race; but as they present no structural differences, they are provisionally referred to the same species.

*Hab.* Central and South America.

- 18619.** Part of the right ramus of the mandible, containing the four last cheek-teeth; from a cavern in Minas Geraes, Brazil. The length of the space occupied by the three true molars is 0,057 against 0,052 in the living form.

*Claussen Collection. Purchased, 1845.*

- 18619 a.** Part of the right ramus of the mandible, containing the four last cheek-teeth; from a cavern in Minas Geraes.

*Claussen Collection. Purchased, 1845.*

- 18957 c.** Fragment of the left ramus of the mandible, with  $\overline{m. 3}$  and part of  $\overline{m. 2}$ ; from a cavern in Minas Geraes. The teeth are of very large size.

*Claussen Collection. Purchased, 1845.*

- 18957.** Part of the left ramus of the mandible containing  $\overline{pm. 4}$ ,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from a cavern in Minas Geraes. The length of the space occupied by the three teeth is 0,047, as against 0,042 in the living form.

*Claussen Collection. Purchased, 1845.*

- 18957 b.** Three canines; from the caverns of Minas Geraes.

*Claussen Collection. Purchased, 1845.*

- 18957 e.** Three molars; from the caverns of Minas Geraes.

*Claussen Collection. Purchased, 1845.*

- 18619.** The left radius and ulna, of large size; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845*

- 18619 b.** Bones of a foot; from a cavern in Minas Geraes.

*The following specimens may belong to small individuals of this or large individuals of the next species.*

- 18707.** Two humeri; from the caverns of Minas Geraes.

*Claussen Collection. Purchased, 1845.*

<sup>1</sup> Règne Animal, vol. i. p. 238 (1817).

<sup>2</sup> *Vide* H. Gervais and Ameghino, 'Mammifères fossiles de l'Amérique du Sud,' p. 113 (1880).

18957 d. The right radius and ulna ; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845*

18709. The right femur ; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845.*

***Dicotyles tajacu* (Linn.<sup>1</sup>).**

Syn. *Sus tajacu*, Linn.<sup>2</sup>

*Dicotyles torquatus*, Cuvier<sup>3</sup>.

*Hab.* Southern part of North America and the regions to the south.

18953. The cranium of an immature individual ; from a cavern in Minas Geraes, Brazil. *Claussen Collection. Purchased, 1845.*

18952. The anterior half of the cranium ; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845.*

18958 a. Part of the right maxilla, showing the six cheek-teeth in a much-worn condition ; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845.*

18958 b. Part of the right maxilla of an immature individual, showing the last two premolars (half protruded) and the first two true molars ; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845.*

18958 c. Four detached molars ; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845.*

18958 d. The anterior part of the palate, showing the incisors, left canine, and pm. 2 ; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845.*

18958 e. The anterior part of the palate, showing the incisors ; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845.*

18955. The mandible of an immature individual, wanting some of the teeth ; from a cavern in Minas Geraes. *Claussen Collection. Purchased, 1845.*

<sup>1</sup> Syst. Nat. ed. 12, vol. i. p. 103 (1766), *Sus*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Règne Animal, vol. i. p. 237 (1817).

18956. The symphysis and right ramus of the mandible of a male, showing all the teeth except the incisors and  $\overline{\text{pm. 2}}$ ; from a cavern in Minas Geraes.  
*Claussen Collection. Purchased, 1845.*
- 18956 a. The nearly complete mandible of a female; from a cavern in Minas Geraes.  
*Claussen Collection. Purchased, 1845.*
- 18958 f. Fragment of the left ramus of the mandible, containing the unworn  $\overline{\text{m. 3}}$ ; from a cavern in Minas Geraes.  
*Claussen Collection. Purchased, 1845.*
- 18958 h. Three specimens of the humerus; from the caverns of Minas Geraes. *Claussen Collection. Purchased, 1845.*
- 18958 i. Three specimens of the radius and ulna; from the caverns of Minas Geraes. *Claussen Collection. Purchased, 1845.*
- 18958 j. Three specimens of the two median metacarpals; from the caverns of Minas Geraes.  
*Claussen Collection. Purchased, 1845.*

Genus **HYOTHERIUM**, H. v. Meyer<sup>1</sup>.

Syn. *Palæochærus*, Pomel<sup>2</sup>.

*Chæromorus*, P. Gervais<sup>3</sup> (*ex* Lartet, MS.).

*Chærotherium*, Lartet<sup>4</sup>.

*Amphichærus*, Bravard, MS.

*Dentition*:—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ . The genus is represented in the Tertiaries of Europe, Asia, and America. It is not regarded by Filhol as the ancestral form either of *Sus* or *Dicotyles*; but it is most probable, from the structure of its molars, that it was intimately related with such ancestral stock. Allied extinct American forms, in one of which the number of premolars is  $\frac{3}{3}$ , have been described<sup>5</sup>. The upper premolars are simpler in structure than the true molars.

<sup>1</sup> 'Die fossilen Zähne und Knochen von Georgensgmünd,' p. 43 (1834).

<sup>2</sup> Bull. Soc. Géol. France, sér. 2, vol. iv. p. 381 (1847 [read 1846]).

<sup>3</sup> Zool. et Pal. Françaises, 1st ed. vol. i. p. 198, note 1 (1848-52).

<sup>4</sup> Notice sur la Colline de Sansan, p. 32 (1851).

<sup>5</sup> Vide 'Palæontologia Indica,' ser. 10, vol. iii. p. 94.



***Hyotherium typum* (Pomel<sup>1</sup>).**

Syn. *Chaeropotamus meissneri*, H. v. Meyer<sup>2</sup>.

*Hyotherium meissneri*, H. v. Meyer<sup>3</sup>.

*Palaeochærus typus*, Pomel<sup>4</sup>.

*Palaeochærus suillus*, Pomel<sup>5</sup>.

*Hyotherium suillum*, Filhol<sup>6</sup>.

*Amphichærus typus*, Bravard, MS.

Peters, in the Denkschr. k. Ak. Wiss. vol. xxix. p. 214 (1869), identifies *H. typum* with *H. meissneri*, and the specimens in the Museum indicate that this is probably correct; the latter species was, however, never properly defined, and it therefore seems best to adopt the former name, which is in very general use. Peters also identifies with this form the so-called *Chaeromorus simplex* from the Middle Miocene of Sansan; but this view is not borne out by the specimens in the Museum. If *H. typus* and *H. meissneri* be really the same, the range of the species extends from the Upper Eocene of Caylux to the Middle Miocene of Elgg, and Georgensgmünd<sup>7</sup>.

*Hab.* Europe.

**M. 2198.** Part of the palate; from the Middle Miocene of Elgg (Zurich), Switzerland<sup>8</sup>. This specimen shows the three true molars of either side, in an early stage of wear; from the locality whence it was obtained it may probably be regarded as belonging to the typical *H. meissneri*. The length of the space occupied by the three true molars is 0,0365, and the interval between m. 3 of opposite sides 0,022. The former dimensions agree very closely with that of the specimen figured by P. Gervais in the Zool. et Pal. Françaises, 2nd ed. pl. xxxiii. fig. 1, under the name of *Palaeochærus typus*. Purchased, 1885.

<sup>1</sup> Catalogue Méthodique, p. 87 (1853), *Palaeochærus*.

<sup>2</sup> 'Die fossilen Zähne und Knochen von Georgensgmünd,' p. 51 (1834). From the context there is evidently some earlier occurrence of the name, which the writer has not found.

<sup>3</sup> Neues Jahrb. 1841, p. 104.

<sup>4</sup> Catalogue Méthodique, p. 87 (1853).

<sup>5</sup> *Loc. cit.*

<sup>6</sup> Ann. Sci. Géol. vol. xi. art. 1, p. 14 (1880; vol. dated 1881).

<sup>7</sup> In the table on page x of Part I. of this work, the writer followed Max Schlosser in placing the Georgensgmünd beds in the Upper Miocene; its Mammalian fauna appears, however, to indicate that it should rather be placed in the Middle Miocene. See Introduction.

<sup>8</sup> The Elgg beds are not mentioned in the table on page x of Part I. of this work. They are placed by Max Schlosser in the same horizon as those of Käpfnach.

- M. 2203.** Fragment of the right maxilla, showing m. 1 and m. 2 in an almost unworn condition; from the Lower Miocene of St. Gerand-le-Puy (Allier), France. The teeth are appressed, shows the three true of the cranium figured by on the right, and pm. 3 and pm. 4 on pl. vi.; their united shows the alveoli of the earlier teeth as *Purchased*, 1885. canine<sup>1</sup>. It is described by Filhol in the containing the vol. xi. art. 1, pp. 15-16. The length of y protruded; pied by the three true molars is 0,034, and imen agrees between m. 3 of opposite sides 0,022. The true, *ol. op. cit.* indistinguishable in form from those of the last 0,0305. but are slightly smaller; all the cheek-teeth agree, 1867. closely with those of the specimen figured by (loc. cit.), with the exception that pm. 4 has one inscayed two external tubercles; this, according to Filhol, bears the variable character.

*Bravard Collection. Purchased, 185.*

- 27593.** Fragment of the left maxilla, containing mm. 3, mm. 4, and m. 1, together with the detached m. 2; from the Lower Miocene of Sauvetat (Puy-de-Dôme), France. This specimen is noticed by P. Gervais in the Zool. et Pal. Françaises, 2nd ed. p. 184, and referred to *H. waterhousei*, on the ground that the columns of the true molars are more pyramidal than in the present species; this is, however, entirely due to their unworn condition, and as they agree in size with the corresponding teeth of No. M. 2198, the specimen is referred to the present species. The length of m. 1 is 0,0115, and that of m. 2 0,0125.

*Croizet Collection. Purchased, 1848.*

- M. 2199.** Fragment of the right maxilla, containing m. 2 and m. 3, together with several detached upper true molars; from the Upper Eocene of Caylux (Tarn-et-Garonne). As these specimens are indistinguishable from the corresponding teeth of the preceding specimen, they may at least provisionally be referred to the same species.

*Purchased, 1885.*

- 34961 b.** The greater part of the mandible in a somewhat broken condition, showing the last four cheek-teeth; from the Lower Miocene of Romagnat (Allier). This specimen

<sup>1</sup> The canine of a *Palæomeryx* or *Amphitragulus* has been inserted in the left side.

**Hyotherium typum** (Pomel<sup>1</sup>).

Syn. *Chæropotamus meissneri*, H. v. Meyer<sup>2</sup>. species ;

*Hyotherium meissneri*, H. v. Meyer<sup>3</sup>. agreement

*Palæochærus typus*. The length of the space occupied by *Palæochærus* true molars is 0,042. In the specimen figured *Hyotheriuvrais* in the Zool. et Pal. Françaises, 2nd ed. *Amphich.* fig. 2 a, under the name of *P. typus*, the corre-

Peters, in true length is only 0,035, indicating the probability identifies *H.*'s specific distinctness.

Museum in *Bravard Collection. Purchased, 1852.*

was, how-ist of a fragment of the right ramus of the mandible, con-adopt t<sup>l</sup> taining the much-worn  $\overline{m. 2}$  and  $\overline{m. 3}$ . The original is identif from La Molière (? Tarn-et-Garonne). The length of the the M space occupied by the two teeth is 0,034 ; the correspond- the ing space in No. 34961 *b* being 0,032.

re *Presented by John Brown, Esq., 1852.*

**M. 2200.** A second and third lower true molar, agreeing almost precisely with those of 34961 *b*, and provisionally referred to the same species ; from the Upper Eocene of Caylux (Tarn-et-Garonne). These teeth are apparently identical with those of the mandible from the same deposits figured by Filhol in the Ann. Sci. Géol. vol. viii. pl. xiv. fig. 292, under the name of *Chæromorus simplex*.

*Purchased, 1885.*

**27805.** Fragment of the right ramus of the mandible, with the unworn  $\overline{m. 2}$  and  $\overline{m. 3}$ , perhaps belonging to a small individual of the present species ; from the Lower Miocene of Antoign (Puy-de-Dôme).

*Croizet Collection. Purchased, 1848.*

**M. 2202.** Fragment of the left ramus of a mandible of a young animal, provisionally referred to this species ; from the Upper Eocene of Caylux. This specimen shows  $\overline{mm. 4}$  (length 0,0165), the broken base of  $\overline{m. 1}$ , and the germ of  $\overline{m. 2}$  detached from its alveolus.

*Purchased, 1885.*

**Hyotherium waterhousei** (Pomel<sup>1</sup>).

Syn. *Palæochærus waterhousei*, Pomel<sup>2</sup>.

This species is considerably larger than the last, but the structure of the molars is very similar.

*Hab.* France.

<sup>1</sup> Catalogue Méthodique, p. 86 (1853), *Palæochærus*.

<sup>2</sup> *Loc. cit.*



**M. 2203.** Fragment of the right maxilla, showing m. 1 and m. 2 in an almost unworn condition; from the Lower Miocene of St. Gérard-le-Puy (Allier), France. The teeth are apparently identical with those of the cranium figured by Filhol in the Ann. Sci. Géol. vol. xi. pl. vi.; their united length measuring 0,029. *Purchased*, 1885.

**40894.** Fragment of the left ramus of the mandible containing the three true molars, the last being not fully protruded; from the Lower Miocene of Allier. This specimen agrees precisely with the mandible figured by Filhol, *op. cit.* pl. vii.; the united length of m. 1 and m. 2 measuring 0,0305. *Presented by C. Falconer, Esq.*, 1867.

**27789.** Part of the left ramus of the mandible in a much-decayed condition, probably belonging to a small individual of the present species, showing the last five cheek-teeth; from the Lower Miocene of Sauvetat (Puy-de-Dôme). *Croizet Collection. Purchased*, 1848.

***Hyotherium scemmeringi*, H. v. Meyer<sup>1</sup>.**

Syn. *Chæropotamus scemmeringi*, H. v. Meyer<sup>2</sup>.

(?) *Palæochærus major*, Pomel<sup>3</sup>.

This is the largest species, but the specimens figured by Peters indicate a considerable variation in size.

*Hab.* Europe.

**26698.** Fragment of the right maxilla, containing the three true molars; from the Lower Miocene of Allier. This specimen is noticed by P. Gervais in the Zool. et Pal. Françaises, 2nd ed. p. 183, and referred to Pomel's *P. major*<sup>4</sup>; it differs from *H. waterhousei* by its superior size (the length of the space occupied by the three molars is 0,055), by its wider teeth, and the more complex crown of m. 3. In all these characters it agrees with the description of *Palæochærus major*, and also with the teeth of *H. scemmeringi*, figured by Peters in the Denkschr. k. Ak. Wiss.

<sup>1</sup> 'Die fossilen Zähne und Knochen von Georgensgmünd,' p. 55 (1834). (The text indicates that the name occurs in an earlier passage.) *Chæropotamus*.

<sup>2</sup> *Ibid.* p. 62.

<sup>3</sup> Catalogue Méthodique, p. 86 (1853).

<sup>4</sup> Filhol in the Ann. Sci. Géol. vol. xi. art. 1, p. 19, is unable to identify this species, and suggests that it may be the same as *H. waterhousei*. *Vide* Wilckens, Biol. Centralblatt, 1885, p. 236.



vol. xxix. pl. i., being intermediate in point of size between the specimens represented in figs. 6 and 7.

*Pomel Collection. Purchased, 1851.*

**Hyotherium simplex** (P. Gervais <sup>1</sup>).

Syn. *Chæromorus simplex*, P. Gervais <sup>2</sup>.

As already mentioned, Peters identified this form with *H. typum*, but the specimen noticed below indicates a much smaller animal.

*Hab.* France.

**M. 2204.** Part of the right ramus of the mandible containing the last four cheek-teeth; from the Middle Miocene of Sansan (Gers), France. This specimen agrees precisely with the dimensions of the type mandible described by Gervais, and figured by him, *op. cit.* 2nd ed. pl. xxxiii. fig. 5 <sup>3</sup>, as is shown by the following measurements:—

	Type.	B. M.
Length of space occupied by the three true molars .....		0,0385
Length of $\overline{\text{m. 1}}$ .....	0,011	0,0113
„ $\overline{\text{m. 2}}$ .....	0,013	0,013
„ $\overline{\text{m. 3}}$ .....	0,016	0,0165

*Purchased, 1855.*

**M. 2398.** Portion of the humerus, radius, and three metapodials, probably belonging to this species; from the Middle Miocene of Sansan.

*No history.*

*Limb-bones of Hyotherium.*

**40895.** Two metapodials of a large species; from the Lower Miocene of Allier. *Presented by C. Falconer, Esq., 1867.*

**21968.** A metapodial of a very small species; from the Lower Miocene of Allier. *Croizet Collection. Purchased, 1848.*

**40768.** The proximal extremity of a metapodial of a small species ([?] *H. simplex*); from the Middle Miocene of Sansan.

*Presented by C. Falconer, Esq., 1867.*

<sup>1</sup> Zool. et Pal. Françaises, 1st ed. vol. ii. Exp. no. 33, p. 7 (1848-52), *Chæromorus*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> In the figure  $\overline{\text{m. 1}}$  is too long.

Genus **HIPPOHYUS**, Falconer and Cautley<sup>1</sup>.

This genus appears to be allied to *Hyotherium*, but has an extremely complex structure in its molar dentition (*vide* 'Palæontologia Indica,' ser. 10, vol. iii. p. 90).

*Dentition* :—I.  $\frac{3}{5}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{5}$ .

**Hippohyus sivalensis**, Falconer and Cautley<sup>2</sup>.

*Hab.* India.

**M. 2053.** Cranium of an adolescent individual; from the Pliocene (*Fig.*) of the Siwalik Hills, India. This specimen is the type of the genus and species, and is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxx. fig. 1, the dentition of the right side (reversed) being represented of the full size in pl. lxxi. fig. 1 of the same work; it is described by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pp. 86, 87.

*Cautley Collection. Presented, 1842.*

**M. 2054.** Fragment of the right ramus of the mandible, showing (*Fig.*)  $\overline{m. 2}$  and  $\overline{m. 3}$ , in an imperfect condition; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 2.

*Cautley Collection. Presented, 1842.*

**M. 2055.** Fragment of the right ramus of the mandible, showing (*Fig.*) part of  $\overline{pm. 4}$ ,  $\overline{m. 1}$ , and  $\overline{m. 2}$ ; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 3.

*Cautley Collection. Presented, 1842.*

**16582.** Fragment of the right ramus of the mandible, containing (*Fig.*)  $\overline{pm. 4}$ ,  $\overline{m. 1}$ , and  $\overline{m. 2}$ , mostly perfect; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 4.

*Cautley Collection. Presented, 1842.*

Genus **SUS**, Linn.<sup>3</sup>

Including *Porcula*, Hodgson, and *Potamochoerus*<sup>4</sup>, Gray.

*Dentition* :—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ . In some fossil species the first premolar is absent.

<sup>1</sup> In Owen's 'Odontography,' p. 562 (1840-45).

<sup>2</sup> *Ibid.*

<sup>3</sup> Syst. Nat. ed. 12, vol. i. p. 102 (1766).

<sup>4</sup> The reasons for including these two genera are given in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 49.

*Sus scrofa*, Linn.<sup>1</sup>

The talon of the third true molar is of moderate length, and the united length of m. 1 and m. 2 usually exceeds that of m. 3.

*Hab.* Europe and North Africa.

- M. 1343.** Casts of the last four right upper true molars, of very large size. The originals were obtained from the Forest-Bed of Sidestrand, Cromer, Norfolk, and are figured by E. T. Newton in the Vertebrata of the Forest-Bed Series (Mem. Geol. Surv. Eng.) pl. vi. fig. 4.

*Presented by E. T. Newton, Esq., 1884.*

- 28079.** Fragment of the left maxilla, containing the last two premolars and the first two true molars; from the Pleistocene of Grays, Essex. *Presented by John Brown, Esq., 1852.*

- 18758, 21659, 21669, 22034, 22037, 22038.** Numerous detached teeth; from the Pleistocene of Grays. *Purchased.*

- 43708.** Two specimens of the last upper, and one of the last lower true molar; from the Pleistocene fissures of Oreston, near Plymouth, Devonshire. *Purchased, about 1860.*

- 18815.** The right upper canine of a male, of very large size; from the Pleistocene of Grays. *Purchased, 1845.*

- 39909.** Palatal portion of the cranium of a female, showing all the cheek-teeth and the alveoli of the incisors; from Burwell Fen, Cambridgeshire. *Purchased, 1866.*

- 41454.** Cranium of a female; from river-silt at Walthamstow, Essex. *Purchased, 1869.*

- 41455.** Cranium of a young individual; from river-silt at Walthamstow. *Purchased, 1869.*

- M. 1344.** The cranium (imperfect) of a subadult female; from the bed of the Ouse at Newport Pagnell, Buckinghamshire.

*Presented by Major Lockner, 1884.*

- 28052.** The right ramus of the mandible of a male; from the Pleistocene of North Bridge, Colchester, Essex.

*Presented by John Brown, Esq., 1852.*

- 40055.** The mandible of a smaller male; from a river-deposit at Lambeth, Surrey. *Purchased, 1866.*

<sup>1</sup> Syst. Nat. ed. 12, vol. i. p. 102 (1766).

- 198 a (O. C.) The mandible of a male, agreeing in size with the last, and wanting many of the teeth ; locality unknown.  
*No history.*
39910. The mandible of a female, wanting some of the cutting-teeth ; from Burwell Fen. *Purchased, 1866.*
38096. The anterior extremity of the mandible of a male, showing the canines and some of the incisors and premolars ; from the turbary of Lough Gur, Grange, County Limerick, Ireland. *Presented by the Count de Salis, 1864.*
38097. The anterior extremity of the mandible of a male, showing the canines and some of the incisors and premolars ; from the turbary of Lough Gur.  
*Presented by the Count de Salis, 1864.*
38098. The left lower canine of a male, of large size ; from the turbary of Lough Gur.  
*Presented by the Count de Salis, 1864.*
43677. Part of one ramus of the mandible of a young individual, showing  $\overline{\text{mm. 3}}$ ,  $\overline{\text{mm 4}}$ ,  $\overline{\text{m. 1}}$ , and  $\overline{\text{pm. 3}}$ , and  $\overline{\text{pm. 4}}$  in alveolo ; from the Pleistocene fissures of Oreston.  
*Purchased, about 1860.*
21295. Part of the right ramus of the mandible, showing the last four cheek-teeth ; from the Pleistocene of Grays.  
*Purchased.*
- 21295 a. Fragment of the left ramus of the mandible with the third true molar, in an unworn condition ; from the Pleistocene of Grays. *Purchased.*
- 20276, 21295, 22037. Several lower canines ; from the Pleistocene of Grays. *Purchased.*
21634. The distal extremity of the right humerus ; from the Pleistocene of Grays. *Purchased.*
- M. 1916. The proximal portion of the left ulna ; from a fen in Norfolk. *Presented by Sir R. Owen, K.C.B., 1884.*
- 19843, 21265, 21637. Several metapodials ; from the Pleistocene of Grays. *Purchased.*
19837. A second phalangeal ; from the Pleistocene of Grays.  
*Purchased.*



19884. The atlas vertebra of a large male ; from the Pleistocene of Grays. *Purchased.*

23142. The atlas vertebra of a male ; from the Pleistocene of Maidstone, Kent. *Purchased, 1849.*

27904. The atlas vertebra ; from the Pleistocene of Clacton, Essex. *Presented by John Brown, Esq., 1852.*

M. 1915. The atlas vertebra of a small female ; from a fen in Norfolk. *Presented by Sir R. Owen, K.C.B., 1884.*

*In the extreme complexity of the talon of m. 3 the following specimen agrees with the Indian S. cristatus ; the large size of the alveoli of the canines renders it somewhat improbable that it belongs to a domestic breed crossed with an Asiatic stock.*

41170. The palate of a male, showing the alveoli of the canines, and all the cheek-teeth except pm. 1 ; from the bed of the Thames at Hammersmith. *Purchased, 1868.*

*The following specimens are provisionally referred to the present species ; they belong to the Brome Collection (Presented, 1876), and were obtained from the Caverns of Gibraltar ; they are noticed by Busk in the Trans. Zool. Soc. vol. x. pp. 126-128.*

47665. Three fragments of a maxilla, showing the three true molars and the later premolars.

47666. Several detached molars.

47667. Two portions of the mandible, one showing the three true molars and the other m. 1 and m. 2.

47668. Several detached molars.

47669. Fragment of the left ramus of the mandible of an immature individual, showing m. 1 and m. 2.

47671. Four detached canines.

47672. The glenoidal half of the left scapula.

47673. The distal halves of the associated third and fourth metatarsals.

47674. Two associated first phalangeals, one imperfect.

**Sus falconeri**, Lydekker<sup>1</sup>.

Syn. *Sus sivalensis*, Blainville<sup>2</sup>.

This species is characterized by the extreme complexity of the structure of the true molars, especially the third. In this complexity the species makes an approach towards *Phacochoerus*. The cranium resembles *S. barbatus*.

*Hab.* India.

**15386.** Cranium of a male; from the Pliocene of the Siwalik Hills, (Fig.) India. This specimen shows the whole of the cheek-dentition of the right side, and the alveolus of the canine. It is figured (under the name of *S. giganteus*) by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxxix. fig. 3; and is described by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pp. 66-68<sup>3</sup>.

*Cautley Collection. Presented, 1842.*

**M. 2044.** Middle portion of the cranium of a subadult individual, (Fig.) showing the last five cheek-teeth of both sides; from the Pliocene of the Siwalik Hills. Figured by Baker and Durand in the Journ. As. Soc. Beng. vol. v. pl. xlv. fig. 2, and noticed by the present writer, *op. cit.* p. 70.

*Cautley Collection. Presented, 1842.*

**M. 2042.** Part of the cranium of an immature female, showing the (Fig.) base of the canine, and the first six cheek-teeth with a portion of m. 3 in *alveolo*; from the Pliocene of the Siwalik Hills. Figured by Baker and Durand, *op. cit.* pl. xlv. fig. 1, and by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 14 (as *S. giganteus*); it is noticed by the present writer, *op. cit.* p. 70.

*Cautley Collection. Presented, 1842.*

**M. 2013.** Cranium of a young (? female) individual, showing the (Fig.) broken bases of the greater part of the milk-dentition, m. 1 in a partially worn condition, and several other permanent teeth in *alveolo*; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxx. fig. 4

<sup>1</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. p. 66 (1884).

<sup>2</sup> Ostéographie, Genus *Sus*, pl. ix. (1847).

<sup>3</sup> Owing to a confusion in the Museum Register, the specimen is referred to as No. 16386.

(as *S. giganteus*), and noticed by the present writer, *op. cit.* p. 70.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

- M. 2043.** Fragment of the palate of an adult, showing m. 2 and m. 3 (Fig.) of either side, and the hinder half of the left m. 1; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 13 (under the name of *S. giganteus*), and described and figured by the present writer, *op. cit.* p. 71, pl. vii. fig. 5. In this specimen the molars are narrow, and of extremely complex structure; m. 3 being much larger than the corresponding tooth of No. 15386. *Cautley Collection. Presented, 1842.*

- M. 2012.** The greater part of the mandible of a male, showing parts (Fig.) of the incisors and canines, and the cheek-dentition of either side, in a well-worn condition; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxx. fig. 5 (as *S. giganteus*), and described by the present writer, *op. cit.* p. 72.

*Presented by General Sir W. E. Baker, K.C.B., 1848.*

- 16614.** The anterior portion of the mandible of a male, showing the (Fig.) alveoli of the canines, and most of the cheek-teeth in a very much worn and broken condition; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxx. fig. 6 (as *S. giganteus*), and noticed by the present writer, *op. cit.* p. 75.

*Cautley Collection. Presented, 1842.*

- 15387.** The greater part of the mandible of a subadult female; from (Fig.) the Pliocene of the Siwalik Hills. This specimen shows the whole of the dentition in a somewhat broken condition, and is figured by Falconer and Cautley, *op. cit.* pl. lxx. fig. 7 (as *S. giganteus*), and is noticed as No. 16559, by the present writer, *op. cit.* p. 75; its dentition agrees with that of a specimen in the Dublin Museum of Science and Art, figured by him in pl. vii. fig. 1 of the volume cited.

*Presented by General Sir W. E. Baker, K.C.B., 1848.*

- 16612.** Part of the left ramus of the mandible, containing the three (Fig.) true molars (m. 1 broken), in a well-worn condition; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 15 (as *S. giganteus*), and

noticed by the present writer, *op. cit.* p. 74; its molars, which are of an elongate type, closely resemble those of a specimen in the Indian Museum, Calcutta, figured by the writer in pl. vii. fig. 2 of the volume cited.

*Cautley Collection. Presented, 1842.*

16609. Part of the right ramus of the mandible, with the last five cheek-teeth, in an early condition of wear; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

16595. Fragment of the right ramus of the mandible, showing the greater part of  $\overline{m. 3}$ , in an early stage of wear; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

15893. Fragment of the right ramus of the mandible, showing a portion of  $\overline{m. 2}$ , and the complete  $\overline{m. 3}$  in an almost unworn condition; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

16611. Fragment of the right ramus of a mandible, probably belonging to the present species, showing the hinder part of  $\overline{m. 3}$ ; from the Pleistocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

16598. Fragment of the right ramus of a young *Sus*, perhaps belonging to the present species; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

*The following specimens probably belong either to the present species or to S. giganteus.*

18174. The symphyseal extremity of the mandible of a female; from (*Fig.*) the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 18.

*Cautley Collection. Presented, 1842.*

- 18174 a. The symphyseal extremity of the mandible of a male, with the crowns of the teeth broken off; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

- M. 2047, M. 2048. Two specimens of the proximal half of the right humerus; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*



- M. 2049.** The distal third of the left femur; from the Pliocene of the Siwalik Hills. *Presented by Dr. Hugh Falconer.*

- 40992.** The bones of a foot, comprising the phalangeals and the distal third of the metapodials; from the Pliocene of the Siwalik Hills. *Cautley Collection. Presented, 1842.*

### **Sus, sp. a.**

The cranium noticed below appears to indicate a species allied to *S. falconeri* in the structure of its molars, but of considerably smaller size. It is probable that a fragment of a mandible in the Indian Museum, Calcutta (No. B. 438), may belong to the same species.

*Hab. India.*

- M. 2403.** The greater part of the damaged cranium of an immature individual; from the Pliocene of the Siwalik Hills, India. The last four cheek-teeth are shown, *m. 3* being in *alveolo*.

*Transferred from the Old Indian Museum, 1880.*

### **Sus, sp. b<sup>1</sup>.**

In the structure of its lower molars, this form is allied to the last; except in its somewhat larger size, it closely resembles the existing *S. cristatus*.

*Hab. India.*

- 36843.** The greater part of the mandible of a subadult (female?) (*Fig.*) individual, with the crowns of the anterior teeth broken off; from the Pleistocene of the Narbada Valley, India. This specimen is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxx. fig. 8 (under the name of *S. giganteus*), and is noticed by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 85.

*Presented by C. Fraser, Esq. Before 1843.*

- 36725.** Anterior portion of the mandible of an immature individual; from the Pleistocene of the Narbada Valley.

*Presented by the Secretary of State for India, 1860.*

*(Collected by C. Fraser, Esq.)*

<sup>1</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. p. 85 (1884).

***Sus antiquus*, Kaup<sup>1</sup>.**

A large species, with simple talons to the last true molars and comparatively large lower canines.

*Hab.* Europe.

- M. 395.** Cast of the symphysis and right ramus of the mandible, showing the alveoli of the incisors, the base of the canine and pm. 1, and the last six cheek-teeth,  $\overline{m. 1}$  being broken. The original is from the Upper Miocene of Eppelsheim, Hesse-Darmstadt, and is the type of the species; it is preserved in the Museum at Darmstadt, and is figured by Kaup in the *Oss. Foss. d. Darmstadt*, pt. ii. pl. viii. fig. 1, and in the 'Beiträge,' pt. iv. pl. iv. fig. 1.

*Egerton Collection. Purchased, 1882.*

***Sus erymanthius*, Roth and Wagner<sup>2</sup>.**

*Syn.* (♀) *Sus major*, P. Gervais<sup>3</sup>.

Allied to the last, but with smaller canines and narrower cheek-teeth; the first premolar is absent in both jaws in the adult.

*Hab.* Europe.

- 37352.** Cast of the palate, showing the six cheek-teeth of either side, in an early condition of wear. The original is in the Museum at Munich, and is from the Lower Pliocene of Pikermi, Attica. The length of the space occupied by the six cheek-teeth is 0.142; these teeth agree precisely with those of the specimen figured by Gaudry in the 'Animaux Fossiles et Géologie de l'Attique,' pl. xxxviii. fig. 5.

*Purchased, 1863.*

- M. 69.** Fragment of the left maxilla, containing pm. 3, pm. 4, and m. 1, in a much-worn condition; from the Lower Pliocene of Pikermi.

*Purchased, 1881.*

- M. 2206.** Fragment of the left maxilla of an immature individual, containing m. 1 and m. 2, and the broken bases of the two preceding premolars; from the Lower Pliocene of Pikermi.

*Purchased, 1885.*

- M. 70.** Fragment of the right ramus of the mandible, with the three true molars, in an imperfect condition; from the

<sup>1</sup> *Oss. Foss. d. Darmstadt*, pt. ii. p. 8 (1833).

<sup>2</sup> *Abh. math.-phys. Cl. k.-bay. Ak. Wiss.* vol. vii. pt. ii. p. 418 (1854).

<sup>3</sup> *Zool. et Pal. Françaises*, 1st ed. vol. ii. Exp. no. 12 (1848-52).

Lower Pliocene of Pikermi. The dimensions of  $\overline{m. 3}$  are  $0,046 \times 0,021$ , as against  $0,050 \times 0,0255$  in the corresponding tooth of *S. anticus*. *Purchased, 1881.*

- M. 71.** The proximal extremity of the right radius and ulna; from the Lower Pliocene of Pikermi. *Purchased, 1881.*

### **Sus, sp. c.**

The two teeth noticed below indicate a form apparently closely allied to, but smaller than, *S. erymanthus*.

*Hab.* England.

- 28998.** The third left lower true molar, in an almost unworn condition; from the Red Crag of Suffolk. This tooth seems indistinguishable in form from  $\overline{m. 3}$  of *S. erymanthus*, but its length is only 0,041, while that of the former is 0,044 in the specimen figured by Gaudry. *Purchased.*

- 28998 a.** Cast of the hinder half of the unworn third left lower true molar, agreeing precisely with the last specimen. The original is from the Red Crag of Sutton, Suffolk.

*Presented by J. S. Offord, Esq.*

- 28949.** Fragment of a lower molar, probably belonging to the present form; from the Red Crag of Suffolk. *Purchased.*

### **Sus giganteus, Falconer and Cautley<sup>1</sup>.**

The true molars of this species are of the simple type of those of *S. erymanthus*, but are relatively wider; the upper premolars are also wider, and this is still more markedly the case with the premolars in the mandible provisionally referred to this species by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xi. fig. 1.

*Hab.* India, and (?) China.

- 15385.** The cranium, imperfect anteriorly, and showing the last (*Fig.*) four cheek-teeth in a well-worn condition; from the Pliocene of the Siwalik Hills, India. This specimen is the type, and is figured by Falconer and Cautley in the 'Fauna

<sup>1</sup> Fauna Antiqua Sivalensis, pt. 8, pl. lxxix. figs. 1 & 2 (1847). Most of the other specimens on the same plate are specifically distinct. Forsyth-Major (Quart. Journ. Geol. Soc. vol. xli. p. 3 [1885]) is inclined to identify the Val d'Arno *S. strozzi*, Meneghini, with *S. giganteus* of Falconer and Cautley; but the writer is not aware whether that identification refers to that species as now restricted, or to *S. falconeri*, Lyd.

*Antiqua Sivalensis*, pl. lxix. fig. 1; and is described by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 53.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

16166. The middle portion of the cranium, showing the last five cheek-teeth of either side in a medium stage of wear; (Fig.) from the Pliocene of the Siwalik Hills. This specimen is figured by Falconer and Cautley, *op. cit.* fig. 2; and is described, and the dentition of the right side figured, by the present writer, *op. cit.* pp. 53, 54, pl. xi. fig. 2.

*Cautley Collection. Presented, 1842.*

- 16166 a. The palate, showing m. 2 and m. 3 of either side in a very much-worn condition; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

16592. Fragment of the right maxilla, probably belonging to a female individual, and containing the three true molars (m. 1 imperfect) in an early stage of wear; from the Pliocene of the Siwalik Hills. This specimen is figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 12, and noticed by the present writer, *op. cit.* p. 55.

*Cautley Collection. Presented, 1842.*

16590. Fragment of the left maxilla, containing pm. 4 and m. 1, agreeing in size with the corresponding teeth of No. 16166; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 16, and noticed by the present writer, *op. cit.* p. 55.

*Cautley Collection. Presented, 1842.*

- M. 2274. An unworn third right upper true molar, agreeing in size with m. 3 of No. 16592; from the Siwaliks of the Punjab.

*By exchange with the Indian Museum, Calcutta, 1885.*

- 16592 a. Part of the upper canine of a male, perhaps belonging to the present species; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 19.

*Cautley Collection. Presented, 1842.*

- M. 2045. Fragment of a right maxilla, containing pm. 2 and pm. 3, provisionally referred to this species; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*



- M. 2462.** A left maxilla, containing pm. 4, m. 1 (broken), and the broken base of m. 2, provisionally referred to this species; from a cave in Sechuen, N.W. China. This specimen is indistinguishable from the corresponding part of No. 16166. *Presented by T. M. Kingsmill, Esq., 1878.*

### **Sus titan, Lydekker<sup>1</sup>.**

This is the largest known species; the true molars are of a more elongated type than those of the last species, and the lower premolars narrower.

*Hab.* India.

- M. 2273.** The fourth left upper premolar, and the first true molar, in a slightly worn condition; from the Siwaliks of the Punjab, India. The length of pm. 4 is 0,023, as against 0,0168 in *S. giganteus* (No. 16166), and the two teeth differ in form.

*By exchange with the Indian Museum, Calcutta, 1885.*

- M. 2271.** Fragment of the left ramus of the mandible, containing the three true molars (m. 3 wanting the hind talon); from the Siwaliks of the Punjab. This specimen agrees precisely with the one figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. viii. fig. 4.

*By exchange with the Indian Museum, Calcutta, 1885.*

- M. 2270.** Part of the left ramus of the mandible, showing pm. 4, m. 1, and m. 2; from the Siwaliks of the Punjab.

*By exchange with the Indian Museum, Calcutta, 1885.*

- M. 2275.** Fragment of the left ramus of the mandible, showing pm. 4, m. 1, and the anterior lobe of m. 2; from the Siwaliks of the Punjab.

*By exchange with the Indian Museum, Calcutta, 1885.*

- 16313.** Fragment of the right ramus of the mandible, showing m. 1 and m. 2; from the Pliocene of the Siwalik Hills.

*Cautley Collection. Presented, 1842.*

- M. 2272.** Fragment of a third true molar; from the Siwaliks of the Punjab. This tooth exhibits the numerous cusps characteristic of the species.

*By exchange with the Indian Museum, Calcutta, 1885.*

<sup>1</sup> Palæontologia Indica (Mem. Geol. Surv. Ind.), ser. 10, vol. iii. p. 59 (1884).

**Sus hysudricus**, Falconer and Cautley<sup>1</sup>.

In this small species the true molars have a simple structure, with a small talon to the last tooth. It is apparently allied to *S. paleochærus* and other European forms, but the mandible is less deep than the type mandible of the last-named species figured by Kaup in the *Oss. Foss. d. Darmstadt*, pt. ii. pl. ix. fig. 1. There is a considerable amount of variation in the size of the specimens referred to the present species.

*Hab.* India.

**M. 2050.** Part of the right maxilla, showing the last five cheek-teeth, in an early stage of wear; from the Siwaliks of Perim Island, Gulf of Cambay, India. Figured by Falconer and Cautley, in the '*Fauna Antiqua Sivalensis*,' pl. lxxi. fig. 5; and noticed by the present writer in the '*Palæontologia Indica*,' ser. 10, vol. iii. p. 78<sup>2</sup>. The teeth closely resemble those of the specimens represented in pl. viii. figs. 10, 11, of the volume last cited. *No history.*

**M. 2051.** Fragment of the left maxilla of a smaller individual, showing the three true molars, in a well-worn condition; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 7, and noticed by the present writer in the passage cited.

*Cautley Collection. Presented, 1842.*

**37267.** The cranium in a much-damaged condition, and with the crowns of the molars hammered off; from the Siwaliks of Perim Island. Noticed by the present writer, *op. cit.* p. 78. *No history.*

**15362.** The middle portion of the cranium of an immature female, showing the canine and all the cheek-teeth except *m. 3*; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxx. fig. 2 (the dentition of the full size being given in pl. lxxi. fig. 9); and noticed by the present writer, *op. cit.* p. 77.

*Cautley Collection. Presented, 1842.*

<sup>1</sup> *Fauna Antiqua Sivalensis*, pt. 8, pl. lxx. (1847).

<sup>2</sup> Owing to the reversing of the figures in the '*Fauna Antiqua Sivalensis*,' this and the next specimen are referred to as belonging to the wrong side of the jaw.

- M. 2276.** Two fragments of the maxilla, one showing m. 1 (broken) and m. 2, and the other m. 2 (broken) and m. 3; from the Siwaliks of the Punjab, India.

*By exchange with the Indian Museum, Calcutta, 1885.*

- M. 2052.** The nearly complete mandible of a subadult individual, (*Fig.*) of very large size; from the Pliocene of the Siwalik Hills. This specimen is figured by Falconer and Cautley, *op. cit.* pl. lxx. fig. 3, and is noticed by the present writer, *op. cit.* p. 79 (as No. 17090). It shows the whole of the cheek-dentition; the length of the space occupied by the three true molars being 0,077.

*Cautley Collection. Presented, 1842.*

- 16603.** Fragment of the right ramus of the mandible of a somewhat (*Fig.*) smaller individual, showing m. 2 and m. 3; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxx. fig. 8; m. 3 has an additional lobe to the hind talon.

*Cautley Collection. Presented, 1842.*

- M. 2277.** Fragment of the left ramus of the mandible, agreeing in size with the last specimen, and showing pm. 4, m. 1, and m. 2; from the Siwaliks of the Punjab.

*By exchange with the Indian Museum, Calcutta, 1885.*

- 16605.** Fragment of the right ramus of the mandible of a slightly (*Fig.*) smaller individual, showing pm. 4, m. 1, m. 2, and part of m. 3; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 6.

*Cautley Collection. Presented, 1842.*

- 15373.** Part of the left ramus of the mandible of a very small (*Fig.*) individual, showing the four last cheek-teeth; from the Pliocene of the Siwalik Hills. The length of the space occupied by the three true molars is 0,057. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 10.

*Cautley Collection. Presented, 1842.*

- 37130.** The anterior portion of the mandible, showing the last three (*Fig.*) premolars; from the Pliocene of the Siwalik Hills. Figured by Falconer and Cautley, *op. cit.* pl. lxxi. fig. 11.

*Cautley Collection. Presented, 1842.*

- M. 2278.** Four fragments of the mandible; from the Siwaliks of the Punjab.

*By exchange with the Indian Museum, Calcutta, 1885.*

**Sus, sp. d.***Hab.* India.

- M. 2046.** Fragment of the right maxilla, containing pm. 4, m. 1, and m. 2, in a much-worn condition; from the Pliocene of the Siwalik Hills, India. The true molars are larger and relatively wider than those of *S. hysudricus*, the dimensions of m. 2 being  $0,019 \times 0,020$ .

*Cautley Collection. Presented, 1842.***Sus palæochærus, Kaup<sup>1</sup>.**

This species is closely allied to *S. hysudricus*; but the mandible is deeper, the lower premolars larger, and the cusps of the true molars apparently somewhat higher.

*Hab.* Europe.

- 46573.** A worn third left upper true molar, provisionally referred to this species; from the Red Crag of Suffolk. This tooth is slightly smaller than the one from the same deposits figured by Owen in the Quart. Journ. Geol. Soc. vol. xii. p. 233, fig. 10, but is otherwise similar; the specimen figured by Kaup in the Oss. Foss. d. Darmstadt, pt. ii. pl. ix. fig. 3, agrees with the one figured by Owen.

*Purchased, 1875.*

- 39039.** An unworn third right upper true molar, provisionally referred to this species; from the Red Crag of Suffolk. This tooth is rather larger than the last.

*Bowerbank Collection. Purchased, 1865.*

- 44049, 44605, 46007, 46574, 46691-5, 48961.** Numerous upper and lower molars, provisionally referred to this species; from the Red Crag of Suffolk.

*Purchased.***Sus chæroides, Pomel<sup>2</sup>.**

This species is allied to the last, and it has been suggested that the two may be really identical, but the specimens in the Museum do not admit of deciding the question.

*Hab.* Europe.

- 37346.** Cast of the symphysis and part of the right ramus of the mandible. The original is from the Middle Miocene of

<sup>1</sup> Oss. Foss. d. Darmstadt, pt. ii. p. 11 (1833).<sup>2</sup> Arch. Sci. Phys. Nat. ser. 4, vol. viii. p. 160 (1848).



Monte Bamboli (Tuscany), Italy. The specimen shows all the cheek-teeth except  $\overline{\text{pm. 1}}$ ; the length of the space occupied by the three premolars is 0,042, and that by the true molars 0,065. The jaw is apparently more slender than the mandible of *S. palæochaerus* figured by Kaup in the Oss. Foss. d. Darmstadt, pt. ii. pl. ix. fig. 1, and the premolars are relatively smaller. *Purchased, 1863.*

- 37345.** Cast of part of the right ramus of the mandible of a young individual, showing the last three milk-molars and  $\overline{\text{m. 1}}$ . The original is from the Middle Miocene of Monte Bamboli. The length of  $\overline{\text{mm. 4}}$  is 0,021. *Purchased, 1863.*

FAMILY and GENUS *non det.*

*Hab.* India.

- M. 2095.** The left half of a cranium, with the crowns of the teeth hammered off; from the Pliocene of the Siwalik Hills, India. This specimen is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lxxvii. fig. 2, under the name of *Merycopotamus dissimilis*, but the base of the molars indicates teeth of a much simpler type. The general contour of the cranium is suilline, but the narrow premaxilla and the form of the maxilla in advance of the orbit apparently differentiates it from *Sus*, to which the present writer at first referred it<sup>1</sup>. In the absence of the crowns of the teeth it appears impossible to determine the present affinities of the specimen.

*Cautley Collection. Presented, 1842.*

- M. 2096.** Symphysial extremity of the mandible of an apparently suilline animal, perhaps specifically identical with the last specimen; from the Pliocene of the Siwalik Hills. This specimen shows the alveoli of the incisors and canines, and is remarkable for the extremely narrow interalveolar channel, which forms a deep spout-like groove.

*Cautley Collection. Presented, 1842.*

Family PHACOTHERIDÆ.

*Dentition:*—I.  $\frac{1}{(2-3)}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{2}{3}$ , M.  $\frac{3}{3}$ . All the teeth except the canines and last molars have a tendency to disappear in old animals. The last true molar consists of a great number of agglomerated

<sup>1</sup> Geol. Mag. dec. 3, vol. i. p. 547 (1884).

columns or denticules. There are indications of a transition between this family and the preceding one.

Genus **PHACOCOCHÆRUS**, Cuvier<sup>1</sup>.

*Phacochærus*, sp. *a*.

It appears impossible to distinguish the detached molars of *P. africanus* from those of *P. æthiopicus*; the specimens noticed below belong to one or other of these species.

*Hab.* Africa.

48063. A last true molar; apparently recent, S. Africa.

*Presented by J. P. Squier, Esq., 1877.*

M. 67. A last true molar; from a Pleistocene deposit, S. Africa.

*Purchased, 1880.*

**Phacochærus**, sp. *b*.

*Hab.* S. Africa.

41389. A last true molar; from a superficial deposit near Colesberg, S. Africa. This tooth appears of a narrower type than the teeth of either of the two existing species, the tubercles of the middle row being longer, more compressed laterally, and fewer in number.

*Purchased, 1869.*

## Family LISTRIODONTIDÆ.

*Dentition*:—I.  $\frac{3}{3}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ . The true molars carry simple transverse ridges; the upper premolars are simpler than the true molars.

Genus **LISTRIODON**, H. v. Meyer<sup>2</sup>.

Syn. *Tapirotherium*, Blainville<sup>3</sup> (*ex* Lartet, MS.).

*Lophiochærus*, Bayle<sup>4</sup> (*ex* Lartet, MS.).

**Listriodon splendens**, H. v. Meyer<sup>5</sup>.

Syn. *Tapirotherium larteti*, P. Gervais<sup>6</sup>.

*Listriodon larteti*, P. Gervais<sup>7</sup>.

<sup>1</sup> Règne Animal, vol. i. p. 236 (1817).

<sup>2</sup> Neues Jahrb. 1846, p. 466.

<sup>3</sup> Ostéographie, Genus *Tapirus*, p. 52 (1846).

<sup>4</sup> Bull. Soc. Géol. France, sér. 2, vol. xiii. p. 29 (1856).

<sup>5</sup> *Loc. cit.*

<sup>6</sup> Comptes Rendus, vol. xxviii. p. 547 (1849).

<sup>7</sup> Zool. et Pal. Françaises, 1st ed. vol. i. p. 50 (1848-52).

*Tapirotherium blainvillianum*, Lartet<sup>1</sup>.

*Lophiochærus blainvillei*, Bayle<sup>2</sup> (ex Lartet, MS.).

*Hab.* Europe.

**33577.** Two portions of the cranium; from the Middle Miocene of L'Isle-en-Dodon (Garonne), France. The cranium is much damaged, but appears to have been very Pig-like in form, and resembles *Dicotyles*. On the right side the three true molars are shown, and on the left all the cheek-teeth except pm. 1; they are but little worn. *Purchased*, 1858.

**33577 a.** Two fragments of the right and left rami of the mandible, and several detached teeth, probably belonging to the same individual as the last; from L'Isle-en-Dodon. The larger fragment of the mandible shows the last five cheek-teeth. *Purchased*, 1858.

**40959.** Casts of portions of the right maxilla and the right ramus of the mandible, showing all the cheek-teeth except the first premolar in an early stage of wear. The originals were obtained from the Middle Miocene of Grive-St.-Alban (Isère), France. *Purchased*, 1868.

**40959 a.** Casts of detached true molars. The locality whence the originals were obtained is not known. *Purchased*.

**M. 2205.** Several detached upper premolars and molars; from the Middle Miocene of Simorre (Gers), France. *Purchased*, 1855.

**21848.** A left upper true molar, in an early stage of wear; from the Middle Miocene of Sansan (Gers). *Croizet Collection. Purchased*, 1848.

### **Listriodon pentapotamiæ** (Falconer<sup>3</sup>).

*Syn. Tapirus pentapotamiæ*, Falconer<sup>4</sup>.

This species is very closely allied to the last, and additional specimens are required to fully determine its affinity.

*Hub.* India.

**40766.** Cast of the fourth right upper premolar. The original,

<sup>1</sup> Notice sur la Colline de Sansan, p. 31 (1851).

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Palæontological Memoirs, vol. i. p. 415 (1868), *Tapirus*.

<sup>4</sup> *Loc. cit.*

together with the corresponding tooth of the opposite side, was obtained from the Siwaliks of Khushálghar, below Attock, Punjab, and is preserved in the Indian Museum, Calcutta. They both belong to the same individual as the type true molars figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. viii. figs. 15a, 17; and are noticed in 'Falconer's Palæontological Memoirs,' vol. i. p. 415, where they are compared to the anterior premolar of *Tapirus*.

Made in the Museum, 1885.

### Family HIPPOPOTAMIDÆ.

In the form of the mandible, which has a descending plate at the angle, this family closely resembles *Merycopotamus*. The molars are bunodont in structure, with four columns, which present trefoil-shaped disks on their worn surfaces.

Genus **HIPPOPOTAMUS**, Linn.<sup>1</sup>

Including:—*Hexaprotodon*, Falconer and Cautley<sup>2</sup>.

*Tetraprotodon*, Falconer and Cautley<sup>2</sup>.

*Chæropsis*, Leidy<sup>4</sup>.

*Dentition*:—I.  $\frac{(2-3)}{(1-3)}$ , C.  $\frac{1}{1}$ , Pm.  $\frac{4}{4}$ , M.  $\frac{3}{3}$ . The reasons for including all the forms in the type genus are given by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 47.

***Hippopotamus amphibius***, Linn.<sup>5</sup>

Syn. *Hippopotamus antiquus*, Desmarest<sup>6</sup>.

*Hippopotamus capensis*, Desmoulins<sup>7</sup>.

*Hippopotamus senegalensis*, Desmoulins<sup>8</sup>.

*Hippopotamus major*, Owen<sup>9</sup>.

*Hippopotamus annectans*, Falconer<sup>10</sup>.

*Tetraprotodon amphibius*, Falconer<sup>11</sup>.

*Tetraprotodon major*, Falconer<sup>12</sup>.

There are two incisors in each jaw; the inner lower incisor is

<sup>1</sup> Syst. Nat. ed. 12, vol. i. p. 101 (1766).

<sup>2</sup> Asiatic Researches, vol. xix. p. 51 (1836).

<sup>3</sup> Loc. cit.

<sup>4</sup> Journ. Ac. Nat. Sci. Philad. ser. 2, vol. ii. p. 213 (1853).

<sup>5</sup> Loc. cit.

<sup>6</sup> Mammalogie, p. 388 (1822).

<sup>7</sup> Journ. de Physiol. vol. v. (1825) (teste Morton).

<sup>8</sup> Loc. cit.

<sup>9</sup> Rep. Brit. Assoc. for 1843, p. 223. (From Cuvier's *Grande Hippopotame*

*Fossile*, Ann. d. Muséum, vol. v. p. 106 [1804]).

<sup>10</sup> Journ. Ac. Nat. Sci. Philad. ser. 2, vol. i. p. 237 (1849).

<sup>11</sup> Ibid. p. 236.

<sup>12</sup> Ibid. p. 237.

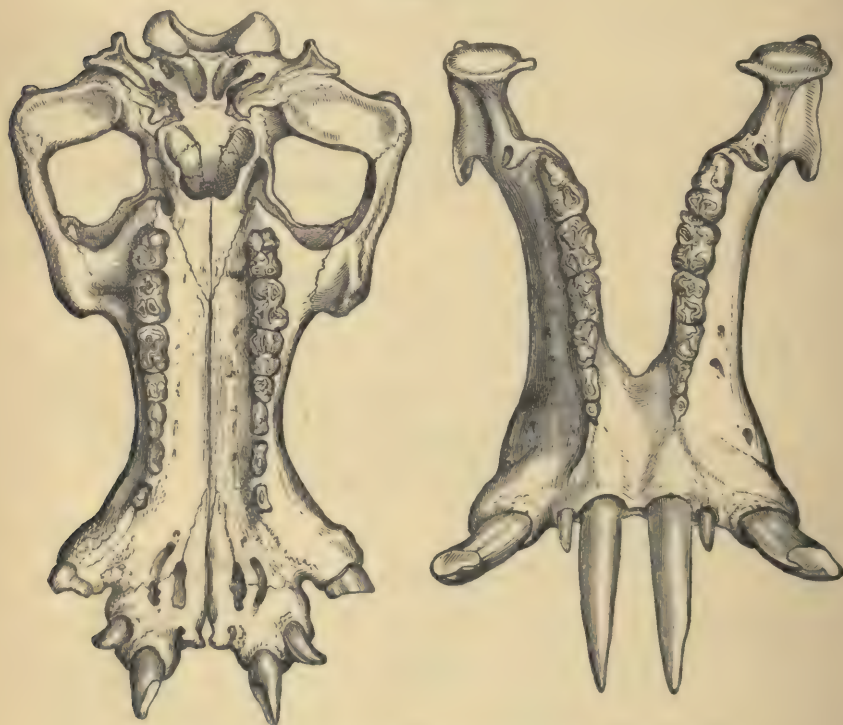


much larger than the outer. One instance is known of the occurrence of three lower incisors<sup>1</sup>.

The writer agrees with Boyd-Dawkins<sup>2</sup> in regarding the large fossil European Hippopotamus (of which the proper designation is *H. antiquus*) merely as a race of *H. amphibius*, from which it presents no structural differences. The large fossil teeth from Nubia noticed below (No. 40855) were referred by Falconer to the existing species, but are equal in size to the largest European fossil specimens of the so-called *H. antiquus*.

*Hab.* Europe (Upper Pliocene and Pleistocene) and Africa (Pleistocene and Recent).

Fig. 37.



*Hippopotamus amphibius*.—Cranium and mandible. Recent, Africa.  
Much reduced.

<sup>1</sup> Vide 'Palæontologia Indica,' ser. 10, vol. iii. p. 37.

<sup>2</sup> Quart. Journ. Geol. Soc. vol. xli. p. 8 (1885).

**28779.** The occipital portion of the cranium; from the Upper Pliocene of the Val d'Arno (Tuscany), Italy.

*Presented by J. B. Pentland, Esq., 1853.*

**28779 a.** Palatal portion of the cranium, showing the three true molars; from the Upper Pliocene of the Val d'Arno.

*Presented by J. B. Pentland, Esq., 1853.*

**28785.** Part of the palate, showing the three true molars of either side and the right pm. 3 and pm. 4; from the Upper Pliocene of the Val d'Arno. Noticed by Falconer in the Quart. Journ. Geol. Soc. vol. xxi. p. 373 (1865) (reprinted in 'Falconer's Palæontological Memoirs,' vol. ii. p. 633); the length of the space occupied by m. 2 and m. 3 is 0,119.

*Presented by J. B. Pentland, Esq., 1853.*

**28788.** Fragment of the right maxilla, containing pm. 2, pm. 4, m. 1, and m. 2; from the Upper Pliocene of the Val d'Arno.

*Presented by J. B. Pentland, Esq., 1853.*

**28789.** Fragment of the left maxilla, with m. 2 and m. 3; from the Upper Pliocene of the Val d'Arno. Noticed by Falconer, *loc. cit.*; the length of the space occupied by the two teeth is 0,110.

*Presented by J. B. Pentland, Esq., 1853.*

**28790.** Fragment of the right maxilla, containing the three true molars in a well-worn condition; from the Upper Pliocene of the Val d'Arno. Noticed by Falconer, *loc. cit.* The length of the space occupied by m. 2 and m. 3 is 0,103.

*Presented by J. B. Pentland, Esq., 1853.*

**28790 a.** The second or third right upper true molar; from the Upper Pliocene of the Val d'Arno.

*Presented by J. B. Pentland, Esq., 1853.*

**40855.** Fragment of the left maxilla, containing m. 2 and m. 3 in an early condition of wear; from a fluviatile deposit near Kalábshi, Nubia. Described by Falconer, *op. cit.* The length of the space occupied by m. 2 and m. 3 is 0,110.

*Presented by Prof. Leith-Adams, 1867.*

**47332.** Five upper and lower molars, four fragments of tusks, a cervical vertebra, and a tympanic; from the Pleistocene of Lavenham, Suffolk. These specimens indicate a small individual.

*Purchased, 1876.*

- 27892.** An upper true molar; from the Pleistocene of Walton Essex.  
*Presented by John Brown, Esq., 1852.*
- 27891.** Part of an upper canine; from the Pleistocene of Walton.  
*Presented by John Brown, Esq., 1852.*
- 38625.** The extremity of an unworn upper canine; from the Pleistocene of Chelmsford, Essex.  
*Presented by W. Roper, Esq., 1864.*
- 28794.** Two specimens of the extra-alveolar portion of the upper canine; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
- 28797.** Two upper incisors; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
- 18815, 21318.** Two specimens of portions of upper incisors; from the Pleistocene of Grays, Essex. *Purchased.*
- 36769.** Part of an upper incisor; from the Pleistocene of Peckham, Surrey.  
*Purchased, 1862.*
- 27735 a** The complete mandible of a subadult female; from the Upper Pliocene of Mont Perrier, near Issoire (Puy-de-Dôme), France. With the exception of the right canine (which has been restored in plaster), the dentition is complete.  
*Croizet Collection. Purchased, 1848.*
- 28786.** Part of the left ramus of the mandible, showing the last four cheek-teeth in a well-worn condition; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
- 28787.** Part of the left ramus of the mandible, with the last four cheek-teeth in a well-worn condition; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
- 28791.** Fragment of the left ramus of the mandible, with  $\overline{m. 2}$  and  $\overline{m. 3}$  in a middle stage of wear; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
- 28792.** Several lower molars; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*

- 28793.** The third left lower true molar ; from the Upper Pliocene of the Val d'Arno.

*Presented by J. B. Pentland, Esq., 1853.*

- 27735 b.** The left half of the symphysis of the mandible of a young individual, showing the incisors and canine *in alveolo* ; from the Upper Pliocene of Perrier.

*Croizet Collection. Purchased, 1848.*

- 27735 c.** The symphysis and part of the right ramus of the mandible of an immature individual ; from the Upper Pliocene of Perrier.

*Croizet Collection. Purchased, 1848.*

- M. 1967.** The germ of the second left lower true molar ; from a cavern in Pietermanns-fontein, Caledon, S. Africa.

*Presented by T. G. Bayfield, Esq., 1884.*

- 18304.** The third left lower true molar, in an unworn condition probably from the Upper Pliocene of the Val d'Arno.

*M'Enery Collection. Purchased, 1842.*

- 107 (O. C.).** A slightly worn first or second lower true molar ; from Kirkdale Cave, Yorkshire.

*Presented by W. Salmond, Esq. Before 1836.*

- 38624.** The third left lower true molar, in a partially worn condition ; from the Pleistocene of Chelmsford.

*Presented by W. Roper, Esq., 1864.*

- 33467.** The third left lower true molar ; dredged off Happisburgh, Norfolk.

*Layton Collection. Purchased, 1858.*

- 32782.** The greater part of the right lower canine, of very large size ; from an English (?) Pleistocene deposit.

*Buckland Collection. Purchased.*

- 28795.** Three specimens of the lower canine, one being of enormous size ; from the Upper Pliocene of the Val d'Arno.

*Presented by J. B. Pentland, Esq., 1853.*

- 32782 a.** The right lower canine ; from the Pleistocene of Huntingdonshire.

*No history.*

- 15941.** Part of a smaller right lower canine ; from the Forest-bed of Bacton, Norfolk.

*Green Collection. Purchased, 1843.*



- 36768.** One half of a longitudinally split lower canine of enormous size ; from the Pleistocene of Peckham. *Purchased*, 1862.
- 38626.** Part of a lower canine ; from the Pleistocene of Chelmsford. *Presented by W. Roper, Esq.*, 1864.
- 46942.** Fragment of a canine ; from the Forest-bed of the Norfolk coast. *Purchased*, 1876.
- 46941.** Terminal portion of the left lower canine ; from the Forest-bed of the Norfolk coast. *Purchased*, 1876.
- 27891 a.** Terminal portion of the left lower canine ; from the Pleistocene of Walton. *Presented by John Brown, Esq.*, 1852.
- 33469.** Fragment of a canine in its alveolus ; from the Forest-bed of Happisburgh, Norfolk.  
*Layton Collection. Purchased*, 1858.
- 36776 a.** Portion of a first lower incisor, of enormous size ; from the Pleistocene of Peckham. The transverse diameter is 0,072. *Purchased*, 1862.
- 46845.** Terminal portion of a lower incisor ; from the Pleistocene of Greenwich, Kent. *Purchased*, 1875.
- 28796.** A first lower incisor, of very large size ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq.*, 1853.
- 43202.** Fragment of a first lower incisor ; from the Pleistocene of Camden Town, London.  
*Wetherell Collection. Purchased*, 1871.
- 40856.** Part of an outer lower incisor ; from the Pleistocene of Bedford. *Presented by C. Falconer, Esq.*, 1867.
- 21653.** Part of an outer lower incisor ; from the Pleistocene of Grays. *Purchased*, 1848.
- 46847.** The glenoidal extremity of the right scapula ; from the Pleistocene of Greenwich. *Purchased*, 1875.
- 27735 d.** Part of the left scapula ; from the Upper Pliocene of Perrier. *Croizet Collection. Purchased*, 1848.
- 28878.** The right scapula (restored) ; from the Upper Pliocene of the Val d'Arno. *Presented by J. B. Pentland, Esq.*, 1853.
- 36417.** The right humerus, wanting the head ; from the Pleistocene of Walton.  
*Brown Collection. Presented by Sir R. Owen, K.C.B.*, 1859.

28823. The head of the right humerus ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
- 27735 e. The right humerus, wanting the head ; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
28777. The right humerus, wanting the head ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
28780. The distal half of the left humerus ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
28773. The left humerus of a young individual, wanting the epiphyses ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
28776. The right radius and ulna ; from the Upper Pliocene of the Val d'Arno. *Presented by J. B. Pentland, Esq., 1853.*
- 27735 f. Two specimens of the right radius and ulna ; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
28807. The left radius of an immature individual, wanting the proximal epiphysis ; from the Upper Pliocene of the Val d'Arno. *Presented by J. B. Pentland, Esq., 1853.*
28784. The right carpus and metacarpus ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
46849. The third left metacarpal ; from the Pleistocene of Greenwich. *Purchased, 1875.*
38627. The acetabular portion of the right innominate ; from the Pleistocene of Chelmsford.  
*Presented by W. Roper, Esq., 1864.*
36419. Fragment of an innominate ; from the Pleistocene of Walton. *Brown Collection. Presented by Sir R. Owen, K.C.B., 1859.*
28775. The greater part of the right innominate ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
27735. The left ilium ; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*

- 27735 g.** The acetabular portion of the left innominate ; from the Upper Pliocene of Perrier.

*Croizet Collection. Purchased, 1848.*

- 38628, 38629.** Two specimens of the right femur ; from the Pleistocene of Chelmsford.

*Presented by W. Roper, Esq., 1864*

- 28774.** The right femur ; from the Upper Pliocene of the Val d'Arno.

*Presented by J. B. Pentland, Esq., 1853.*

- 37735 h.** The right femur ; from the Upper Pliocene of Perrier.

*Croizet Collection. Purchased, 1848.*

- 27735 i.** The left femur, wanting the head ; from the Upper Pliocene of Perrier.

*Croizet Collection. Purchased, 1848.*

- 27735 j.** The proximal two thirds of the left femur ; from the Upper Pliocene of Perrier.

*Croizet Collection. Purchased, 1848.*

- 27735 k.** Two specimens of the distal epiphysis of the left femur ; from the Upper Pliocene of Perrier.

*Croizet Collection. Purchased, 1848.*

- 28798.** Two specimens of the patella ; from the Upper Pliocene of the Val d'Arno.

*Presented by J. B. Pentland, Esq., 1853.*

- 27735 l.** The right patella ; from the Upper Pliocene of Perrier.

*Croizet Collection. Purchased, 1848.*

- 36450.** The right patella ; from the Pleistocene of Peckham.

*Purchased, 1862.*

- 38632.** The left patella ; from the Pleistocene of Chelmsford.

*Presented by W. Roper, Esq., 1864.*

- 27735 m.** Two specimens of the right tibia ; from the Upper Pliocene of Perrier.

*Croizet Collection. Purchased, 1848.*

- 28781.** The right tibia ; from the Upper Pliocene of the Val d'Arno.

*Presented by J. B. Pentland, Esq., 1853.*

- 36418.** The left tibia ; from the Pleistocene of Walton. This bone is chipped by an axe or chisel throughout the greater part of its length.

*Brown Collection. Presented by Sir R. Owen, K.C.B., 1859.*

27975. The right tibia, wanting the proximal epiphysis ; from the Pleistocene of Walton.  
*Presented by John Brown, Esq., 1852.*
7584. The proximal extremity of the right tibia ; from the Pleistocene (?) of Rome. *Mantell Collection. Purchased, 1836.*
- 27735 q. The right metacarpals and phalangeals ; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
- 27735 n. The bones of the left hind foot ; from the Upper Pliocene of Perrier. *Croizet Collection. Purchased, 1848.*
28783. The left calcaneum, navicular, and cuboid ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
28845. The left calcaneum and cuboid ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
28782. The greater number of the bones of the right hind foot ; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
- 27735 o. The left calcaneum, of enormous size ; from the Upper Pliocene of Perrier. *Croizet Collection. Purchased, 1848.*
16096. The left calcaneum, of much smaller size ; from the Pleistocene of Cold Higham (?), Essex. *Purchased.*
36447. The imperfect left calcaneum ; from the Pleistocene of Peckham. *Purchased, 1862.*
- 27735 p. The right calcaneum ; from the Upper Pliocene of Perrier. *Croizet Collection. Purchased, 1848.*
- 28845 a. The right astragalus ; from the Upper Pliocene of the Val d'Arno. *Presented by J. B. Pentland, Esq., 1853.*
16034. The imperfect right astragalus ; from the Pleistocene of Cold Higham. *Purchased.*
38631. The right astragalus ; from the Pleistocene of Chelmsford. *Presented by W. Roper, Esq., 1864.*
38494. The right astragalus ; from the Pleistocene of Grays. *Purchased, 1864.*



- 27735 r. Two specimens of the left astragalus; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
38630. The left astragalus; from the Pleistocene of Chelmsford.  
*Presented by W. Roper, Esq., 1864.*
46848. The left astragalus; from the Pleistocene of Greenwich.  
*Purchased, 1875.*
28797. The atlas vertebra; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*
- 27735 s. The atlas vertebra; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
- 27735 t. The axis vertebra; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
- 27735 u. The third cervical vertebra; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
28800. The sixth (?) cervical vertebra; from the Upper Pliocene of the Val d'Arno. *Presented by J. B. Pentland, Esq., 1853.*
- 27735 v. The seventh cervical vertebra; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
40857. An early dorsal vertebra; from an English Pleistocene deposit.  
*Presented by C. Falconer, Esq., 1867.*
- 27735 w. The centrum of a later dorsal vertebra; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
28801. Two specimens of later dorsal vertebræ; from the Upper Pliocene (?) of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1848.*
- 27735 x. The centrum of a late dorsal vertebra; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
- 27735 y. A lumbar vertebra; from the Upper Pliocene of Perrier.  
*Croizet Collection. Purchased, 1848.*
46846. The last lumbar vertebra, wanting most of the neural arch and the left transverse process; from the Pleistocene of Greenwich.  
*Purchased, 1875.*
32783. Proximal half of a rib; from the Upper Pliocene of the Val d'Arno.  
*Presented by J. B. Pentland, Esq., 1853.*

- 37735 z. The greater portion of a late rib ; from the Upper Pliocene of Perrier. *Croizet Collection. Purchased, 1848.*

**Hippopotamus pentlandi**, H. v. Meyer <sup>1</sup>.

Syn. *Hippopotamus medius*, Owen <sup>2</sup>.

As far as is known, this species appears to be closely allied to, but smaller than, the existing *H. amphibius* ; there are, however, differences in the form of some of the limb-bones, *e. g.* the tibia.

*Hab.* South Europe.

40996. The palate, with the three true molars in a half-worn condition ; from the Grotta di Maccagnone, Cazine, Sicily <sup>3</sup>. The length of the space occupied by the three teeth is 0,112, and the interval between m. 3 of either side 0,054.  
*Presented by C. Falconer, Esq., 1867.*
40995. The palate of a rather larger individual, with the three true molars ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
40910. Fragment of the cranium, showing m. 2 and m. 3 in an early condition of wear, together with some of the bones of the foot ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
40998. Fragment of the left maxilla, with the three true molars ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
41001. Fragment of the right maxilla, with m. 1 and m. 2.  
*Presented by C. Falconer, Esq., 1867.*
41002. Fragment of the left maxilla, with m. 3 ; from the Grotta di Maccagnone. *Presented by C. Falconer, Esq., 1867.*
41006. Numerous detached upper molars ; from the Grotta di Maccagnone. *Presented by C. Falconer, Esq., 1867.*
- 36977-8. Several premolars and true molars ; from a cavern in Palermo. *Purchased, about 1860.*
41000. Fragment of the left maxilla, with m. 2 and m. 3 ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*

<sup>1</sup> *Palæologica*, p. 533 (1832).

<sup>2</sup> *Cat. Foss. Mamm. & Birds in Mus. R. Coll. Surgeons*, p. 240 (1845).

<sup>3</sup> *Vide Quart. Journ. Geol. Soc.* vol. xvi. p. 99 (1860).

40910. An upper true molar ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
40303. A much-worn upper true molar ; from the Grotto del Gigante, Palermo. *Purchased, 1867.*
40911. A little-worn upper true molar ; from the Grotto di San Ciro, Palermo. *Presented by C. Falconer, Esq., 1867.*
27499. Extremity of a small upper canine, provisionally referred to this species ; from the Pleistocene of Malta.  
*Hastings Collection. Purchased, 1855.*
36979. Part of an upper canine ; from a cavern in Palermo.  
*Purchased, about 1860.*
43533. Fragment of the maxilla, with the canine ; from the Grotta di Maccagnone. *Presented by C. Falconer, Esq., 1867.*
41003. Fragment of the right ramus of the mandible, with the last four cheek-teeth ; from the Grotta di Maccagnone. The length of the space occupied by the three true molars is 0,137, and the length of  $\overline{m. 3}$  0,0585.  
*Presented by C. Falconer, Esq., 1867.*
40997. Fragment of the left ramus of the mandible, in a much-crushed condition, showing the three true molars ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
36975. Fragment of the right ramus of the mandible of a large individual, showing  $\overline{m. 3}$  and part of  $\overline{m. 2}$  (the length of  $\overline{m. 3}$  is 0,063) ; from a cavern in Palermo.  
*Purchased, about 1860.*
41005. Part of the left ramus of the mandible, showing the slightly worn  $\overline{m. 3}$  ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
41004. Fragment of the right ramus of the mandible, with  $\overline{m. 2}$  and  $\overline{m. 3}$  ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
40910. Fragment of the left ramus of the mandible, with  $\overline{m. 2}$  ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
41006. Several detached lower true molars ; from the Grotta di Maccagnone. *Presented by C. Falconer, Esq., 1867.*

41008. Two specimens of the fourth lower milk-molar ; from the Grotta di Maccagnone. The length of this tooth is 0.043.  
*Presented by C. Falconer, Esq., 1867.*
36976. The third right lower true molar ; from a cavern in Palermo. The length of this tooth is 0.059.  
*Purchased, about 1860.*
43491. The third left lower true molar, in an early condition of wear ; from the Pleistocene of Crete. The length of this tooth is 0.058.  
*Presented by His Grace the Duke of St. Albans, about 1871.*
- 49325 a. Two specimens of the third lower true molar ; from the Pleistocene of Malleha, Malta. The length of one tooth is 0.056.  
*Spratt Collection. Presented, 1874.*
- 49325 d. Fragment showing an incisor and a deciduous and a true molar ; from the Pleistocene of Malleha.  
*Spratt Collection. Presented, 1874.*
37949. A first lower true molar, provisionally referred to this species ; from the Pleistocene of Malta.  
*Presented by Prof. Leith-Adams.*
37950. Fragment of a canine and an incisor ; from the Pleistocene of Malta.  
*Presented by Prof. Leith-Adams.*
- 41009, 41010. Several specimens of the lower canine ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
27499. Two specimens of the lower canine of this species, or *H. minutus* ; from the Pleistocene of Malta.  
*Hastings Collection. Purchased, 1855.*
41060. An inner lower incisor ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
43536. An inner lower incisor ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
43534. Two specimens of one half of the symphysis of the mandible of young individuals ; from the Grotta di Maccagnone. These specimens show the two incisors *in alveolo*, which agree in proportionate size with those of *H. amphibius*.  
*Presented by C. Falconer, Esq., 1867.*



- 41023-6.** Four imperfect specimens of the scapula ; from the Grotta di Maccagnone. *Presented by C. Falconer, Esq., 1867.*
- 43527.** Two specimens of the proximal extremity of the humerus ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 43528.** Five specimens of the distal half of the humerus ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 37951.** The distal extremity of a humerus probably belonging to a small variety of this species ; from the Pleistocene of Malta.  
*Presented by Prof. Leith-Adams.*
- 41027, 41028, 41035.** Five specimens (some imperfect) of the radius and ulna ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 41036-41039.** Four bones of the carpus, viz. lunar and unciforme ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 41054.** Numerous metacarpals ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 41021, 43529.** Two imperfect specimens of the innominate ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 41029-30.** Two specimens of the proximal half of the femur ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 43530.** Three specimens of the distal portion of the femur ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 41045.** Four specimens of the patella ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 41033, 41034.** Two specimens of the tibia ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*
- 43539.** The proximal portion of the shaft of the right tibia of a young individual ; from the Grotta di Maccagnone.  
*Presented by C. Falconer, Esq., 1867.*

27489. The proximal extremity of a tibia provisionally referred to this species; from the Pleistocene of Malta.

*Hastings Collection. Purchased, 1855.*

41044. Two specimens of the calcaneum; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

41047. Four specimens of the astragalus; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

- 41041, 41042. Four specimens of the cuboid; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

41051. Two specimens of the navicular; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

41056. Two metatarsals; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

41012. Two portions of the atlas, and the centrum of the axis vertebra; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

41014. Three specimens of the third cervical vertebra; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

- 41014 a. Two specimens of the fourth (?) cervical vertebra; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

- 41014 b. Two specimens of the fifth (?) cervical vertebra; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

41015. Two specimens of early dorsal vertebræ; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

41018. An imperfect middle dorsal vertebra; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

41019. An incomplete lumbar vertebra; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

41020. The sacrum; from the Grotta di Maccagnone.

*Presented by C. Falconer, Esq., 1867.*

**Hippopotamus minutus**, Blainville<sup>1</sup>.

Syn. *Hippopotamus minor*, Falconer<sup>2</sup>.

As far as is known, this species is closely allied to the last. The specimens noticed below are referred to it on the authority of Falconer, but they indicate an animal considerably larger than that to which the specimens figured by De Blainville belonged, being intermediate between the latter and *H. pentlandi*; and it appears in reality that there is an almost complete gradation in size from the largest fossil individuals of *H. amphibius*, through *H. pentlandi*, to the smallest specimens of *H. minutus*.

*Hab.* S. Europe.

- 27490.** Two upper true molars and the third left lower true molar; from the Pleistocene of Malta. The length of  $\overline{m.3}$  is 0,047; the length of the specimen figured by De Blainville being 0,039. *Hastings Collection. Purchased, 1855.*
- 27492.** Three anterior teeth; from the Pleistocene of Malta.  
*Hastings Collection. Purchased, 1885.*
- 27493.** Two specimens of the distal portion of the humerus; from the Pleistocene of Malta. The greatest transverse diameter is 0,080, against 0,105 in *H. pentlandi* (No. 43528).  
*Hastings Collection. Purchased, 1855.*
- 27489.** Two specimens of part of the radius and ulna; from the Pleistocene of Malta. The smaller ulna belongs to a young specimen.  
*Hastings Collection. Purchased, 1855.*
- 27489 b.** Part of the left innominate; from the Pleistocene of Malta. The longer diameter of the acetabulum measures 0,063.  
*Hastings Collection. Purchased, 1855.*
- 27494.** The distal half of the left femur; from the Pleistocene of Malta. The greatest transverse diameter across the condyles is 0,106, against 0,134 in *H. pentlandi* (No. 43530).  
*Hastings Collection. Purchased, 1855.*
- 27495, 27489 a.** Two specimens of the tibia; from the Pleistocene of Malta. The length of the perfect specimen is 0,213; the length of the tibia of *H. pentlandi* (No. 41033) being 0,285.  
*Hastings Collection. Purchased, 1855.*

<sup>1</sup> Ostéographie, Genus *Hippopotamus*, pl. vi. (1847). (From Cuvier's *Petit Hippopotame Fossile*, 'Ossements Fossiles,' 2nd ed. vol. i. p. 322 [1821].)

<sup>2</sup> Journ. Ac Nat. Sci. Philad. ser. 2, vol. i. p. 237 (1849).

27496. Two specimens of the right calcaneum, one much larger than the other; from the Pleistocene of Malta.

*Hastings Collection. Purchased, 1855.*

27497. The right astragalus; from the Pleistocene of Malta. The length of the articular surface for the navicular and cuboid is 0,060, against 0,079 in the corresponding bone (No. 41047) of *H. pentlandi*.

*Hastings Collection. Purchased, 1855.*

27498. The right third metatarsal; from the Pleistocene of Malta. The length of this bone is 0,085, against 0,108 in the corresponding metatarsal (No. 41056) of *H. pentlandi*.

*Hastings Collection. Purchased, 1855*

*The following specimens have been provisionally referred to Hippopotamus:—*

44575. The distal epiphysis of a radius; from the Pleistocene on Ganelia fissure, Malta. Figured by Leith-Adams in the Trans. Zool. Soc. vol. ix. pl. xi. fig. 21. The articulating surface is totally different from that of the radius of *H. pentlandi*.

*Leith-Adams Collection. Purchased, 1873.*

44576. Portion of a trapezoid; from the Pleistocene of Mnaidra (Fig.) Gap, Malta. Figured by Leith-Adams, *op. cit.* fig. 22.

*Leith-Adams Collection. Purchased, 1873.*

- 49325, 49326. Two specimens of the shaft of the tibia of young individuals; from the Zebbug Cave, Malta. Figured by Busk in the Trans. Zool. Soc. vol. vi. pl. li. figs. 38, 39.

*Spratt Collection. Presented, 1874.*

### **Hippopotamus palæindicus**, Falconer and Cautley<sup>1</sup>.

Syn. *Tetraprotodon palæindicus*, Falconer<sup>2</sup>.

This species is fully equal in size to the existing *H. amphibius*. The number of upper incisors is unknown; but there are three in the mandible, the middle one being very small, and perhaps disappearing in the adult; the other two are large, and equal in size. The mandibular symphysis is extremely short.

*Hab.* India.

<sup>1</sup> Fauna Antiqua Sivalensis, pt. 7, pl. lvii. (1847).

<sup>2</sup> Journ. Ac. Nat. Sci. Philad. ser. 2, vol. i. p. 237 (1849).



- 40893.** The nearly complete mandible, showing the alveoli of the canines and incisors, the bases of most of the cheek-teeth, and  $\overline{m. 3}$  on the left side; from the Pleistocene of the Narbada Valley, India. This specimen precisely resembles a mandible figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. vi. fig. 2; and is itself noticed on page 45 of the same volume.

*Presented by C. Falconer, Esq., 1867.*

- 41663.** The greater part of the mandible, showing the alveoli of the canines and incisors and the bases of the cheek-teeth; from the Pleistocene of the Narbada Valley. Noticed by the present writer, *loc. cit.*

*Toulmin-Smith Collection. Purchased, 1869.*

- 36830.** The terminal half of the left lower canine; from the Pleistocene of the Narbada Valley. This specimen is figured (*Fig.*) by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lvii. fig. 8, and is referred to the present species on account of its large size.

*Presented by C. Fraser, Esq. Before 1843.*

- 36831.** Fragment of a lower canine agreeing in size with the last (*Fig.*) specimen; from the Pleistocene of Srinagar, Narbada Valley. Figured by Falconer and Cautley, *op. cit.* pl. lvii. fig. 4.

*Presented by C. Fraser, Esq. Before 1843.*

- 36831 a.** Fragment of a lower canine; from the Pleistocene of the Narbada Valley.

*Presented by C. Fraser, Esq. Before 1843.*

### **Hippopotamus namadicus**, Falconer and Cautley<sup>1</sup>.

Syn. *Hexaprotodon namadicus*, Falconer<sup>2</sup>.

This species is somewhat smaller than the last, and distinguished by having three small and subequal-sized mandibular incisors. The mandibular symphysis is slightly longer than in the last species.

*Hab.* India.

- 36838.** Anterior portion of the mandible of a medium-sized individual; from the Pleistocene of the Narbada Valley, India.

<sup>1</sup> Fauna Antiqua Sivalensis, pt. 7, pl. lvii. (1847).

<sup>2</sup> Journ. Ac. Nat. Sci. Philad. ser. 2, vol. i. p. 237 (1849).

Figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lviii. fig. 3; and noticed by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 44.

*Presented by C. Fraser, Esq. Before 1843.*

- 36839.** Anterior portion of the mandible of a large individual; from (Fig.) the Pleistocene of the Narbada Valley. Figured by Falconer and Cautley, *op. cit.* pl. lviii. fig. 2; and noticed by the present writer, *loc. cit.*

*Presented by C. Fraser, Esq. Before 1843.*

- 36840.** Anterior portion of the mandible of a small individual; from the Pleistocene of the Narbada Valley. Figured by Falconer and Cautley, *op. cit.* pl. lviii. fig. 2, and noticed by the present writer, *loc. cit.*

*Presented by C. Fraser, Esq. Before 1843.*

The following specimens belong either to *H. palæindicus* or *H. namadicus*:—

- 36824.** The cranium, imperfect anteriorly, showing the last four (Fig.) cheek-teeth; from the Pleistocene of the Narbada Valley. Figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lvii. fig. 1; and noticed by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 46.

*Presented by C. Fraser, Esq. Before 1843.*

- 36825.** The hinder portion of the cranium, showing the last four (Fig.) cheek-teeth; from the Pleistocene of the Narbada Valley. Figured by Falconer and Cautley, *op. cit.* pl. lviii. fig. 4; and noticed by the present writer, *loc. cit.*

*Presented by C. Fraser, Esq. Before 1843.*

- 37826.** Fragment of the left maxilla and jugal, with the three true molars; from the Pleistocene of Rati-Kurrar, Narbada Valley.

*Presented by C. Fraser, Esq. Before 1843.*

- 36841.** Fragment of the right ramus of the mandible, showing the last four cheek-teeth; from the Pleistocene of the Narbada Valley.

*Presented by C. Fraser, Esq. Before 1843.*

- 36827.** Part of the left ramus of the mandible, showing the last (Fig.) five cheek-teeth; from the Pleistocene of the Narbada

- Valley. Figured by Falconer and Cautley, *op. cit.* pl. lvii. fig. 6. *Presented by C. Fraser, Esq. Before 1843.*
- 36828.** Fragment of the right ramus of the mandible, showing  $\overline{m. 1}$  (Fig.)  $\overline{m. 2}$ , and  $\overline{m. 3}$  (in alveolo). Figured by Falconer and Cautley, *op. cit.* pl. lvii. fig. 7. *Presented by C. Fraser, Esq. Before 1843.*
- 36829.** Fragment of the left ramus of the mandible, showing  $\overline{m. 2}$  (Fig.) and  $\overline{m. 3}$ ; from the Pleistocene of the Narbada Valley. Figured by Falconer and Cautley, *op. cit.* pl. lvii. fig. 3. *Presented by C. Fraser, Esq. Before 1843.*
- 36829 a.** Fragment of a lower canine; from the Pleistocene of the Narbada Valley. *Presented by C. Fraser, Esq. Before 1843.*
- 36834.** The left radius of a small individual; from the Pleistocene of the left bank of the Narbada, 27 miles from Jabalpur. Figured by Falconer and Cautley, *op. cit.* pl. lviii. fig. 10. *Presented by C. Fraser, Esq. Before 1843.*
- 36835.** The proximal extremity of the left femur; from the Pleistocene of the Narbada Valley. Figured by Falconer and Cautley, *op. cit.* pl. lviii. fig. 6. *Presented by C. Fraser, Esq. Before 1843.*
- 36724.** The distal half of the right femur; from the Pleistocene of the Narbada Valley. Figured by Falconer and Cautley, *op. cit.* pl. lviii. fig. 7. *Presented by the Secretary of State for India, 1860.*
- 36836.** The right tibia; from the Pleistocene of the Narbada Valley. In the form of the cnemial crest this bone differs considerably from the tibia of *H. amphibius*. Figured by Falconer and Cautley, *op. cit.* pl. lviii. fig. 9. *Presented by C. Fraser, Esq. Before 1843.*
- 36837.** The proximal half of the right tibia; from the Pleistocene of the Narbada Valley, near Birman Ghat. Figured by Falconer and Cautley, *op. cit.* pl. lviii. fig. 8. *Presented by C. Fraser, Esq. Before 1843.*
- 36842.** The proximal extremity of the left tibia; from the Pleistocene of the Narbada Valley, near Piparea. *Presented by C. Fraser, Esq. Before 1843.*

36832. The first dorsal vertebra; from the Pleistocene of the Narbada Valley. Figured by Falconer and Cautley, *op. cit.* pl. lviii. fig. 5.

*Presented by C. Fraser, Esq. Before 1843.*

36833. The last lumbar vertebra; from the Pleistocene of the (Fig.) Narbada Valley. Figured by Falconer and Cautley, *op. cit.* pl. lvii. fig. 9.

*Presented by C. Fraser, Esq. Before 1843.*

**Hippopotamus sivalensis**, Falconer and Cautley<sup>1</sup>.

Syn. *Hexaprotodon sivalensis*, Falconer and Cautley<sup>2</sup>.

This species is somewhat smaller than the existing *H. amphibius*, and has three incisors in both jaws, those of the mandible being of subequal size; the groove in the upper canine is much deeper than in *H. amphibius*, and the mandibular symphysis relatively longer. The species has been split up by McClelland<sup>3</sup>, but apparently on insufficient grounds.

*Hab.* India.

All the following specimens, unless otherwise stated, are from the Pliocene of the Siwalik Hills, and belong to the *Cautley Collection*. *Presented*, 1842.

- M. 2269. The cranium, showing the alveoli of the incisors, the canines, and the whole of the cheek-teeth, in a well-worn condition. This specimen is figured by Falconer and Cautley in the 'Fauna Antiqua Sivalensis,' pl. lix. fig. 1: and is also figured in 'Falconer's Palæontological Memoirs,' vol. i. pl. xi., as well as in the accompanying woodcut (fig. 38, a, p. 298). It is noticed by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pp. 38, 39, as var. *latidens*.

*Presented by Gen. Sir W. E. Baker, K.C.B., 1848.*

16175. The cranium, showing all the dentition except the incisors. (Fig.) This specimen is figured by Falconer and Cautley, *op. cit.* pl. lix. fig. 2, and is noticed by the present writer, *loc. cit.* It agrees precisely with the last specimen, the dentition being in a well-worn condition.

*Presented by Dr. Hugh Falconer.*

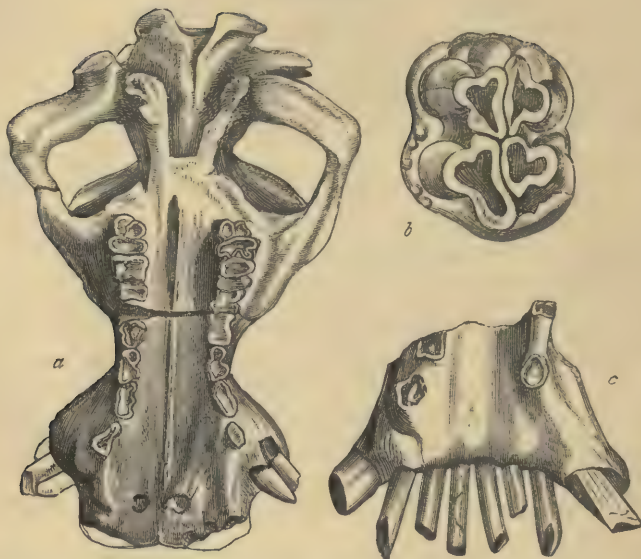
<sup>1</sup> Asiatic Researches, vol. xix. p. 40 (1836).

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Journ. As. Soc. Beng. vol. vii. p. 1038 (1838).



Fig. 38.



*Hippopotamus sivalensis*.—*a*, Palatal view of cranium (No. M. 2269),  $\frac{1}{3}$ ; *b*, third right upper true molar,  $\frac{1}{2}$ ; *c*, upper view of anterior part of mandibular symphysis (No. 16312),  $\frac{1}{8}$ . All the specimens are from the Siwalik Hills.

- 16377.** The cranium, showing most of the dentition in a damaged condition.
- 16378.** The hinder portion of the cranium, showing the last five cheek-teeth in an early condition of wear. Noticed by the present writer, *loc. cit.*
- 16379.** The greater portion of the cranium of an immature individual. This specimen, together with No. 16382, is intermediate in dental characters between Nos. M. 2269 and 16175, and No. 17469; it is noticed by the present writer, *loc. cit.*
- 16380.** An imperfect cranium, showing the cheek-dentition in an early stage of wear.
- 16381.** Middle portion of the cranium of an immature individual, showing the greater part of the permanent dentition and mm. 4. Noticed by the present writer, *loc. cit.*

16382. The hinder half of the cranium, with the crowns of the molars hammered off.
40889. The cranium, imperfect posteriorly, showing the cheek-dentition in a much-worn condition.
- M. 489. Hinder part of the cranium of an immature individual, showing pm. 3, pm. 4, mm. 3, mm. 4, and the three true molars. Noticed by the present writer, *loc. cit.*  
*Presented by the Secretary of State for India, 1860.*
- M. 491. The hinder half of the cranium, showing the three true molars in a middle stage of wear.
17068. The cranium of a small immature individual. This specimen shows the canines and the whole of the cheek-dentition in an early condition of wear; it is figured by Falconer and Cautley, *op. cit.* pl. lix. fig. 3, and noticed by the present writer, *loc. cit.*, as var. *angustidens*. It is also figured in Royle's 'Illustrations of the Botany, &c. of the Himalaya Mountains,' pl. vi. fig. 4 (1839).
17469. The cranium of an immature individual, showing the canines and the whole of the cheek-dentition. This specimen agrees with the last, and is noticed by the present writer, *loc. cit.*; the last milk-molar is still in position, and m. 3 in *alveolo*.
15928. The anterior part of the cranium and mandible, showing the greater portion of the dentition.
17084. The hinder half of the cranium, showing part of m. 3. (*Fig.*) Figured by Falconer and Cautley, *op. cit.* pl. lx. fig. 1.
17081. The hinder part of the cranium and mandible of a very old individual. Figured by Falconer and Cautley, *op. cit.* pl. lx. fig. 2, and noticed by the present writer, *op. cit.* p. 40.
15929. The hinder half of the cranium, showing m. 2 and m. 3. (*Fig.*) Figured by Falconer and Cautley, *op. cit.* pl. lx. fig. 3.
15930. The greater portion of the cranium, with the teeth much worn.
15931. The greater portion of the cranium, with the teeth well worn.

15932. The hinder portion of the cranium of an immature individual, showing the last two milk-, and the first two true molars.
15933. Anterior portion of the cranium, showing the incisors, (Fig.) canines, and premolars. Figured by Falconer and Cautley *op. cit.* pl. lxi. fig. 10.
17827. The anterior portion of the cranium, showing the earlier (Fig.) premolars, canines, and the alveoli of the incisors. Figured by Falconer and Cautley, *op. cit.* pl. lxi. fig. 11.
15934. The anterior half of the cranium, showing the alveoli of the (Fig.) incisors, the canines, and the cheek-teeth as far back as m. 2, the latter being much worn. The dentition of the left side (reversed) is figured by Falconer and Cautley, *op. cit.* pl. lxii. fig. 3<sup>1</sup>; there is a portion of a much-worn tooth wedged in between pm. 4 and m. 1, which is regarded by Falconer as mm. 4.
15935. Middle portion of the cranium, showing m. 2 and m. 3.
15936. Upper portion of the cranium of an immature individual.
15937. The cranium of a young individual, showing the earlier (Fig.) premolars, mm. 3, mm. 4, and m. 1. Figured by Falconer and Cautley, *op. cit.* pl. lxi. fig. 2.
17866. The anterior half of the cranium of a still younger individual, (Fig.) showing the canine *in alveolo*, mm. 3, and mm. 4. Figured by Falconer and Cautley, *op. cit.* pl. lxi. fig. 1.
15938. Fragment of the left maxilla, showing the three true molars and part of mm. 4.
16310. Fragment of the left maxilla, showing the much-worn m. 2 and m. 3.
16329. Fragment of the left maxilla of a young individual, showing mm. 3 and mm. 4.
- 15746, 15747, 15895, 18423, 18426. Numerous detached upper true molars.
16366. Two detached lower premolars. Figured, *op. cit.* pl. lxii. (Fig.) figs. 5, 6.

<sup>1</sup> In the description of the plate the specimen is erroneously referred to the lower jaw.

- 15736, 15739, 15899, 16349, 16532. Detached premolars.
18424. Fragment of the left maxilla, with m. 1.
16367. Part of the upper canine. Figured, *op. cit.* pl. lxii. fig. 7. (*Fig.*)
- 16367 a. Part of the upper canine. Figured, *op. cit.* pl. lxii. fig. 8. (*Fig.*)
- 16367 b. Part of the upper canine. Figured, *op. cit.* pl. xii. fig. 9. (*Fig.*)
17085. The mandible, showing all the teeth except the incisors, of (*Fig.*) which the alveoli remain. Figured by Falconer and Cantley, *op. cit.* pl. lxi. fig. 5.
36722. The anterior portion of the mandible, showing the last three premolars, m. 1 and m. 2, and the alveoli of the incisors and canines.
16174. The right ramus and symphysis of the mandible, showing (*Fig.*) the right canine and cheek-teeth and the alveoli of the incisors of both sides. Figured, *op. cit.* pl. lxi. fig. 4.
16312. The symphysis of the mandible, showing the earlier pre- (*Fig.*) molars, the canines, and incisors, in an almost perfect condition. Figured, *op. cit.* pl. lxi. fig. 7; also in 'Falconer's Palæontological Memoirs,' vol. i. pl. xii. figs. 2, 3, and in woodcut p. 38 (p. 298).
16354. Symphysis of the mandible, cut transversely in two planes (*Fig.*) to show the sections of the canines and incisors. Figured, *op. cit.* pl. lxii. fig. 4.
16316. The nearly complete mandible, showing the cheek-teeth, canines, and the alveoli of the incisors.
16353. The mandible of a subadult individual, showing the cheek-teeth, and the broken bases of the canines and incisors.
16355. The symphysis and part of the left ramus of the mandible, showing the incisors and canines, and most of the left cheek-teeth.
16356. The symphysis and right ramus of the mandible of an immature individual, with m. 3 in *alveolo*.
7452. The symphysis of the mandible, with the crowns of the teeth hammered off. *Mantell Collection. Purchased, 1836.*



- 16357.** Part of the symphysis of the mandible, cut transversely. The lower part of the alveolus of  $\overline{i.2}$  is placed much above the line of the other two teeth of the same series.
- 16383.** Part of the mandible, cut transversely across the middle of the symphysis.
- 16145.** The mandible of a young individual, showing the milk-dentition and  $\overline{m.1}$ . Figured, *op. cit.* pl. lxi. fig. 6. The length of  $\overline{mm.4}$  is 0,049.
- 16360.** Fragment of the right ramus of a similar mandible, containing  $\overline{mm.4}$  and  $\overline{m.1}$ .
- M. 2404.** The symphysis and the greater part of the right ramus of the mandible of a young individual. This specimen shows the broken  $\overline{mm.3}$ , the complete  $\overline{mm.4}$ , and  $\overline{m.1}$  in alveolo.  
*Transferred from the Old Indian Museum, 1880.*
- 16365.** Fragment of the left ramus of the mandible of a young individual, containing  $\overline{mm.4}$ .
- 17560, 16361, 16363, 16364.** Four specimens of the symphysis and part of the left ramus of the mandible of young Hippopotami belonging either to this species or *H. iravaticus*. In the one specimen in which  $\overline{mm.4}$  is shown this tooth has a length of 0,042.
- 48454.** Fragment of the right ramus of the mandible with  $\overline{m.3}$ ; said to be from Perim Island, but, judging from the matrix, more probably from the Siwalik Hills.  
*Presented by C. Falconer, Esq., 1867.*
- 16359.** Fragment of the left ramus of the mandible, with  $\overline{m.2}$  and  $\overline{m.3}$ .
- 32541.** Fragment of the left ramus of the mandible, containing the unworn  $\overline{m.3}$ .

*Some of the smaller of the following specimens may perhaps belong to H. iravaticus.*

- 15745, 18428, 18429, 18423.** Detached specimens of first and second lower true molars.
- 15742, 15743.** Detached specimens of the third lower true molar.
- 15749.** Fragment of the mandible with one premolar.

17958. The left lower canine. Figured, *op. cit.* pl. lxii. fig. 10.
48442. The extremity of the left lower milk (?) canine.
16462. The greater part of the right scapula. Figured by Falconer  
(*Fig.*) and Cautley, *op. cit.* pl. lxv. fig. 1.
16463. The greater part of the right scapula. Figured, *op. cit.*  
(*Fig.*) pl. lxv. fig. 2.
16464. The greater part of the left scapula. Figured, *op. cit.*  
(*Fig.*) pl. lxv. fig. 3.
16465. The glenoidal extremity of the left scapula. Figured, *op.*  
(*Fig.*) *cit.* pl. lxv. fig. 4. *Presented by Dr. Hugh Falconer.*
16466. The glenoidal extremity of the left scapula. Figured, *op.*  
(*Fig.*) *cit.* pl. lxv. fig. 5.
16467. The proximal extremity of the right humerus. Figured,  
(*Fig.*) *op. cit.* pl. lxv. fig. 6.
16670. The proximal extremity of the right humerus. Figured,  
(*Fig.*) *op. cit.* pl. lxv. fig. 7.
16468. The proximal extremity of the right humerus. Figured,  
(*Fig.*) *op. cit.* pl. lxv. fig. 8.
39693. The distal extremity of the right humerus. Figured,  
(*Fig.*) together with No. 39693 a, *op. cit.* pl. lxv. fig. 9.
16469. The distal extremity of the right humerus. Figured, *op.*  
(*Fig.*) *cit.* pl. lxv. fig. 10.
16470. The distal half of the right humerus. Figured, *op. cit.*  
(*Fig.*) pl. lxv. fig. 13.
16471. The distal extremity of the left humerus. Figured, *op. cit.*  
(*Fig.*) pl. lxv. fig. 11.
16472. The distal extremity of the left humerus. Figured, *op. cit.*  
(*Fig.*) pl. lxv. fig. 12.
16473. The distal extremity of the left humerus.
- 39693 a. The proximal extremity of the right radius and ulna.  
(*Fig.*) Figured, together with No. 39693, *op. cit.* pl. lxv. fig. 9.
16474. The proximal extremity of the right radius and ulna.  
(*Fig.*) Figured, *op. cit.* pl. lxv. fig. 14.

16475. The proximal extremity of the right radius and ulna.  
(Fig.) Figured, *op. cit.* pl. lxxv. fig. 15.
16476. The proximal extremity of the right radius, of small size.  
(Fig.) Figured, *op. cit.* pl. lxxv. fig. 17.
16477. The right radius, of very small size. Figured, *op. cit.*  
(Fig.) pl. lxxv. fig. 16.
16479. The distal extremity of the right radius and ulna.
16478. The distal extremity of the right radius and ulna from Burma.  
(Fig.) Figured, *op. cit.* pl. lxxv. fig. 33.
16480. The distal extremity of the right radius. Figured, *op. cit.*  
(Fig.) pl. lxxv. fig. 18.
16481. The distal extremity of the right radius.
40829. The distal extremity of the left radius and ulna.  
*Presented by C. Falconer, Esq., 1867.*
16482. The distal extremity of the left radius and ulna. Figured,  
(Fig.) *op. cit.* pl. lxxv. fig. 20.
16483. The distal extremity of the left radius.
16484. The distal extremity of the left radius.
40828. The distal extremity of the left radius.  
*Presented by C. Falconer, Esq., 1867.*
16867. The right scaphoid. Figured, *op. cit.* pl. lxxv. fig. 22.  
(Fig.)
16868. The right cuneiform. Figured, *op. cit.* pl. lxxv. fig. 24.  
(Fig.)
16869. The left cuneiform.
16870. The right magnum. Figured, *op. cit.* pl. lxxv. fig. 25.  
(Fig.)
16871. The right unciform. Figured, *op. cit.* pl. lxxv. fig. 26.  
(Fig.)
40628. A pisiform. *Presented by C. Falconer, Esq., 1867.*
15910. The right second metacarpal. Figured, *op. cit.* pl. lxxv.  
(Fig.) fig. 27.

15911. A metacarpal.
16872. A metacarpal.
16873. The distal extremity of a metacarpal. Figured, *op. cit.* (Fig.) pl. lxxv. fig. 28.
16874. A first phalangeal. Figured, *op. cit.* pl. lxxv. fig. 30. (Fig.)
18023. A first phalangeal. Figured, *op. cit.* pl. lxxv. fig. 31. (Fig.)
18024. A first phalangeal. Figured, *op. cit.* pl. lxxv. fig. 32. (Fig.)
16875. A first lateral phalangeal. Figured, *op. cit.* pl. lxxv. fig. 29. (Fig.) This bone closely resembles a specimen figured by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. pl. xiv. fig. 2, and originally referred to a struthioid bird. Together with the metacarpals already noticed, it indicates that the foot of the Siwalik Hippopotamus was of a much more slender type than that of the existing species.
15693. A first phalangeal.
18022. A first phalangeal.
40627. A second lateral phalangeal. This specimen closely resembles the two bones figured by the present writer, *op. cit.* figs. 4, 5, and wrongly referred to a struthioid.  
*Presented by C. Falconer, Esq., 1867.*
16876. The middle portion of the left innominate. Figured, *op. cit.* (Fig.) pl. lxxiv. fig. 17.
16878. The acetabular portion of a smaller left innominate.
16877. The acetabular portion of the right innominate. Figured, (Fig.) *op. cit.* pl. lxxiv. fig. 18.
16879. The left femur. Figured, *op. cit.* pl. lxxvi. fig. 1. (Fig.)  
*Presented by Dr. Hugh Falconer.*
16880. The proximal extremity of the left femur. Figured, *op. cit.* (Fig.) pl. lxxvi. fig. 2.
16881. The distal portion of the left femur. Figured, *op. cit.* (Fig.) pl. lxxvi. fig. 5.



- 16882.** The proximal extremity of the right femur. Figured, *op. cit.* pl. lxvi. fig. 3.  
(*Fig.*)
- 17013.** The distal extremity of the right femur. Figured, *op. cit.* pl. lxvi. fig. 4.  
(*Fig.*)
- 17014.** The distal third of the right femur. Figured, *op. cit.* pl. lxvi. fig. 6.  
(*Fig.*)
- 17015.** The right patella. Figured, *op. cit.* pl. lxvi. fig. 8.  
(*Fig.*)
- 17016.** The right patella.
- 17017.** The left patella. Figured, *op. cit.* pl. lxvi. fig. 7.  
(*Fig.*)
- 17018.** The left patella. Figured, *op. cit.* pl. lxvi. fig. 9.  
(*Fig.*)
- 17018 a.** The right tibia. Figured, *op. cit.* pl. lxvi. fig. 13.  
(*Fig.*)
- 17018 b.** The proximal half of the right tibia. Figured, *op. cit.* pl. lxvi. fig. 11.  
(*Fig.*)
- 17018 c.** The proximal half of the left tibia. Figured, *op. cit.* pl. lxvi. fig. 10.  
(*Fig.*)
- 17018 d.** The proximal extremity of the left tibia. Figured, *op. cit.* pl. lxvi. fig. 12.  
(*Fig.*)
- 17018 e.** The distal half of the right tibia. Figured, *op. cit.* pl. lxvi. fig. 14.  
(*Fig.*)
- 17018 f.** The distal half of the right tibia. Figured, *op. cit.* pl. lxvi. fig. 16.  
(*Fig.*)
- 18008.** The distal extremity of the left tibia and fibula. Figured, *op. cit.* pl. lxvi. fig. 15.  
(*Fig.*)
- 18009.** The distal extremity of the left tibia. Figured, *op. cit.* pl. lxvi. fig. 17.  
(*Fig.*)
- 18010.** The right astragalus. Figured, *op. cit.* pl. lxvi. fig. 23.  
(*Fig.*)
- 18010 a.** The right astragalus.

- 18010 b. The left astragalus. Figured, *op. cit.* pl. lxvi. fig. 20.  
(Fig.)
- 18010 c. The left astragalus. Figured, *op. cit.* pl. lxvi. fig. 21.  
(Fig.)
- 18010 d. The left astragalus. Figured, *op. cit.* pl. lxvi. fig. 22.  
(Fig.)
- 18010 e. The left astragalus. Figured, *op. cit.* pl. lxvi. fig. 24.  
(Fig.)
- 18010 f. The left astragalus.
- 40830, 40831. Two specimens of the left astragalus.  
*Presented by C. Falconer, Esq.*
18011. The left calcaneum. Figured, *op. cit.* pl. lxvi. fig. 19.  
(Fig.)
18012. The imperfect right calcaneum.
15768. The left cuboid. Figured, *op. cit.* pl. lxvi. fig. 25.  
(Fig.)
18013. The fourth left metatarsal. Figured, *op. cit.* pl. lxvi.  
(Fig.) fig. 26.
18014. The fourth and fifth left metatarsals, a first phalangeal, and  
(Fig.) a sesamoid. Figured, *op. cit.* pl. lxvi. fig. 27.
18015. The atlas vertebra (imperfect). Figured, *op. cit.* pl. lxiii.  
(Fig.) fig. 2.
18016. The atlas vertebra (imperfect). Figured, *op. cit.* pl. lxiii.  
(Fig.) fig. 3.
18017. The atlas vertebra (imperfect). Figured, *op. cit.* pl. lxiii.  
(Fig.) fig. 4.
48460. The atlas vertebra (nearly perfect).  
*Presented by C. Falconer, Esq., 1867.*
18018. The axis vertebra. Figured, *op. cit.* pl. lxiii. fig. 5.  
(Fig.)
18019. The axis vertebra. Figured, *op. cit.* pl. lxiii. fig. 6.  
(Fig.)

18020. The axis vertebra. Figured, *op. cit.* pl. lxiii. fig. 7.  
(*Fig.*)
18021. The axis vertebra (imperfect). Figured, *op. cit.* pl. lxiii.  
(*Fig.*) fig. 10.
- 18021 a, 18021 b. Two imperfect specimens of the axis vertebra.
- 18021 c. The centrum of the axis vertebra. Figured, *op. cit.*  
(*Fig.*) pl. lxiii. fig. 8.
- 18021 d. The centrum of the axis vertebra. Figured, *op. cit.*  
(*Fig.*) pl. lxiii. fig. 9.
18038. The third cervical vertebra (imperfect). Figured, *op. cit.*  
(*Fig.*) pl. lxiii. fig. 12.
18039. The third cervical vertebra (imperfect).
18310. The fifth cervical vertebra (imperfect). Figured, *op. cit.*  
(*Fig.*) pl. lxiv. fig. 2.
18311. The fifth cervical vertebra (imperfect).
18312. The sixth cervical and the centra of two associated dorsal,  
(*Fig.*) vertebræ. The former is figured, *op. cit.* pl. lxiv. fig. 1.
18313. The sixth cervical vertebra, wanting the descending plate  
(*Fig.*) of the right transverse processes. Figured, *op. cit.* pl. lxiii.  
fig. 11.
18314. The sixth cervical vertebra (imperfect).
18315. The seventh cervical vertebra (imperfect).
18316. The first (?) dorsal vertebra (imperfect). Figured, *op. cit.*  
(*Fig.*) pl. lxiv. fig. 3.
18317. The second dorsal vertebra (imperfect). Figured, *op. cit.*  
(*Fig.*) pl. lxiv. fig. 6.
18318. The second dorsal vertebra (imperfect). Figured, *op. cit.*  
(*Fig.*) pl. lxiv. fig. 4.
18320. The fourth dorsal vertebra (imperfect). Figured, *op. cit.*  
(*Fig.*) pl. lxiv. fig. 5.
18319. The fifth dorsal vertebra (imperfect). Figured, *op. cit.*  
(*Fig.*) pl. lxiv. fig. 7.
18321. The associated fourth and fifth dorsal vertebræ (imperfect).  
(*Fig.*) Figured, *op. cit.* pl. lxiv. fig. 9.

18323. The seventh dorsal vertebra (imperfect). Figured, *op. cit.* (*Fig.*) pl. lxiv. fig. 8.
18324. The eighth dorsal vertebra (imperfect). Figured, *op. cit.* (*Fig.*) pl. lxiv. fig. 10.
18325. The last dorsal vertebra (imperfect).
18326. A lumbar vertebra (imperfect). Figured, *op. cit.* pl. lxiv. (*Fig.*) fig. 11.
18327. A lumbar vertebra (imperfect). Figured, *op. cit.* pl. lxiv. (*Fig.*) fig. 12.
18328. The last lumbar vertebra. Figured, *op. cit.* pl. lxiv. fig. 13. (*Fig.*)
- 18328 a. The sacrum. Figured, *op. cit.* pl. lxiv. fig. 14. (*Fig.*)
18329. The sacrum. Figured, *op. cit.* pl. lxiv. fig. 15.
18330. The sacrum.
17470. A left rib.

**Hippopotamus iravaticus**, Falconer and Cantley<sup>1</sup>.

Syn. *Hexaprotodon iravaticus*, Falconer<sup>2</sup>.

This species is slightly larger than the existing *H. liberiensis*, and has three mandibular incisors; the cranium being unknown. The outer lower incisor is laterally compressed, and the mandibular symphysis apparently relatively longer than in any of the foregoing species. Other specimens are required to indicate its full affinities.

*Hab.* Burma.

14771. Symphysis of the mandible of a subadult individual; from (*Fig.*) the Siwaliks of Burma. This specimen is the type, and is figured by Falconer and Cantley in the 'Fauna Antiqua Sivalensis,' pl. lvii. fig. 10; and noticed by the present writer in the 'Palæontologia Indica,' ser. 10, vol. iii. p. 42. It shows the broken bases of the incisors and canines, and one of the premolars partially protruded.

*Presented by Col. Burney, about 1841.*

<sup>1</sup> Fauna Antiqua Sivalensis, pt. 7, pl. lvii. (1847).

<sup>2</sup> Journ. Ac. Nat. Sci. Philad. ser. 2, vol. i. p. 237 (1849).



16362. The right half of the symphysis of the mandible of a Hippopotamus, perhaps belonging to this species; from the Siwaliks of Burma or India. *No history.*

**Hippopotamus, sp.**

*Hab.* Burma.

14772. Fragment of a lower incisor, of very large size; from the Siwaliks of Burma. This specimen is too large for *H. siwalensis* or *H. iravaticus*; and agrees with the Pleistocene *H. palæindicus*. *Presented by Col. Burney, about 1841.*
16456. Tip of a lower incisor, agreeing in size with the last specimen; probably from the Siwaliks of Burma. *No history.*
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## A D D E N D A.

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Family BOVIDÆ (page 1).

Genus **BISON** (page 24).

**Bison bonasus** (page 24).

Var. *priscus*.

The following specimens were obtained from the Pleistocene of Barrington, Cambridgeshire. (*Purchased*, 1885.)

**M. 2531.** The right horn-core.

*The reference of the following is provisional.*

**M. 2532.** Two imperfect mandibular rami.

**M. 2533.** Numerous detached cheek-teeth.

**M. 2534.** The right and left metacarpus.

**M. 2535.** Two astragali.

**M. 2536.** The right naviculo-cuboid.

**M. 2537.** The right metatarsus.

**M. 2538.** A proximal phalangeal.

**M. 2539.** Several imperfect vertebrae.

Family CERVIDÆ (page 73).

Genus **RANGIFER** (page 79).

**Rangifer tarandus** (page 79).

**M. 2501-6.** A series of specimens from the caves of Gower, Glamorganshire; comprising numerous fragments of antlers of various ages, the hinder portion of a cranium, two left mandibular rami, and a right metatarsus.

*Presented by General E. R. Wood, 1865.*

Genus **CERVUS** (page 82).**Cervus giganteus** (page 82).

- M. 2517.** Two basal halves of antlers; from the Pleistocene of Barrington, Cambridgeshire. *Purchased, 1885.*

**Cervus elaphus** (page 94).

*(The specific reference of some of the following specimens is provisional.)*

- 45357.** The left metacarpus, of large size; from the Pleistocene of Ilford. *Brady Collection. Purchased, 1878.*
- 41741.** The right tibia, of large size; from the turbarry of Walthamstow. *Purchased, 1869.*
- 7572-3.** The right and left tibiæ; from the Pleistocene of Lewes. *Mantell Collection. Purchased, 1836.*
- 19843.** The left tibia, of small size; from the Pleistocene of Grays. *Purchased, 1846.*
- 18154.** The right calcaneum; from the Pleistocene of Ireland. *Purchased. About 1842.*
- 40392.** The right calcaneum; from the Pleistocene of Oundle, Northamptonshire. *Presented by G. N. Edmonds, Esq., 1867.*
- 32515.** The right calcaneum; from a Continental Pleistocene deposit. *Tesson Collection. Purchased, 1857.*
- 19843, 21631.** Three calcanea of small size; from the Pleistocene of Grays. *Purchased.*
- 21631 a.** Two specimens of the proximal elements of the tarsus, of small size; from the Pleistocene of Grays. *Purchased, 1847.*
- 23730 e.** The left astragalus; from the Pleistocene of Slade Green. *Purchased, 1849.*
- 40964.** A left astragalus, of small size; from the Pleistocene of Crayford, Kent. *Purchased.*
- 23129-31.** Two specimens of smaller astragali; from the Pleistocene of Ilford. *Purchased.*

- 21625, 21626, 28131. Several specimens of small astragali; from the Pleistocene of Grays. *Purchased.*
- 21298 a. The left naviculo-cuboid; from the Pleistocene of Grays. *Purchased, 1847.*
- 21298 b, 21312, 21318. Three specimens of the right naviculo-cuboid of a small form; from the Pleistocene of Grays. *Purchased, 1847.*
43207. The left metatarsus; from the turbarry of Walthamstow. *Wetherell Collection. Purchased, 1871.*
- 18817, 20277, 23149, 28079. Four proximal phalangeals; from the Pleistocene of Grays. *Purchased.*
21630. Numerous proximal phalangeals, of smaller size; from the Pleistocene of Grays. *Purchased, 1849.*
- 21630 a. A second phalangeal, agreeing in size with No. 18817; from the Pleistocene of Grays. *Purchased, 1849.*
- 21630 b. Numerous second phalangeals, agreeing in size with No. 21630. *Purchased, 1849.*

Family CAMELIDÆ (page 139).

Genus **AUCHENIA** (page 147).

**Auchenia magna** (Owen<sup>1</sup>).

Syn. *Palauchenia magna*, Owen<sup>2</sup>.

This species is nearly as large as the existing camels; a minute lanariform  $\overline{\text{pm. 1}}$  is present a short distance behind the canine, and there is a small styliiform  $\overline{\text{pm. 3}}$  immediately in front of  $\overline{\text{pm. 4}}$  in the type specimen.

*Hab.* South America.

40155. Casts of the last six cervical vertebræ of the same individual. The originals were obtained from the Pleistocene of Mexico. The casts are described and figured by Owen in the Phil. Trans. for 1870, pp. 69–73, pls. iv., v., vi., vii. *Presented by Don Antonio del Castillo, 1866.*

<sup>1</sup> Phil. Trans. 1870, p. 65, *Palauchenia*.

<sup>2</sup> *Loc. cit.*



## Family TRAGULIDÆ (page 150).

Genus **PRODREMOTHERIUM** (page 150).**Prodremotherium elongatum** (page 150).

- M. 1809.** Several imperfect maxillæ, with teeth; from the Upper Eocene of Bach, near Lalbenque (Lot), France.

*Purchased, 1884.*

- M. 1818.** The right maxilla, containing all the cheek-teeth; from Bach.

*Purchased, 1884.*

- M. 1807.** Several imperfect mandibular rami; from the Upper Eocene of Mouillac (Tarn-et-Garonne), France.

*Purchased, 1884.*

Genus **BACHITHERIUM** (page 155).**Bachitherium curtum** (page 155).

- M. 1809 a.** Part of the left maxilla, with the last four cheek-teeth; from the Upper Eocene of Bach, near Lalbenque (Lot), France.

*Purchased, 1884.*

## Family DICHODONTIDÆ (page 159).

Genus **LOPHIOMERYX** (page 160).**Lophiomeryx chalaniati** (page 160).

- M. 1808.** Several imperfect mandibular rami; from the Upper Eocene of Bach, near Lalbenque (Lot), France.

*Purchased, 1884.*

**Lophiomeryx minor**, Lydekker, n. sp.

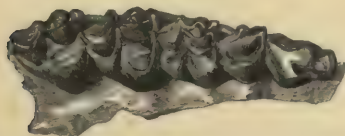
This species is founded on the specimen noticed below.

*Hab.* France.

- M. 1809.** Fragment of the right maxilla containing the last five cheek-teeth; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen (woodcut, fig. 39) indicates a species intermediate in size between *L. chalaniati*

and *L. gaudryi*. The length of the space occupied by the three true molars is 0,027, the corresponding space in *L. chalaniati* being 0,041 (*vide supra*, p. 162). The mandible of *L. gaudryi* (*vide* Filhol, Ann. Sci. Géol. vol. viii. pl. xiii. fig. 280) indicates a considerably smaller species,

Fig. 39.



*Lophiomeryx minor*. Part of the right maxilla; from the Upper Eocene of Caylux. †.

the length of the space occupied by the three lower premolars being only 0,017. The present specimen agrees with *L. chalaniati* in the abortion of the second inner crescent of *m.* 3, and in the incomplete development of the same part in *m.* 2. The third premolar has a well-marked inner cusp, and therefore differs from *Tragulus* and agrees with *Dichodon*. Purchased, 1884.

#### Family CÆNOTHERIIDÆ (page 166).

Genus **DICHOBUNUS** (page 179).

**Dichobunus leporinus** (page 180).

- M. 1836.** Part of the left maxilla, with the three true molars; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. Purchased, 1884.

- M. 1840.** Several imperfect mandibular rami; from the Upper Eocene of Mouillac (Tarn-et-Garonne), France. Purchased, 1884.

#### Family ANOPLOTHERIIDÆ (page 182).

Genus **XIPHODON** (page 182).

**Xiphodon gracilis** (page 183).

- M. 1832.** The greater part of the left ramus of the mandible, with the last five cheek-teeth; from the Upper Eocene of Bach, near Lalbenque (Lot), France. Purchased, 1884.

*The following specimens were obtained from the Upper Eocene of Débruge, near Apt (Vaucluse); and belong to the Bravard Collection (Purchased, 1852).*

**30682, 30703.** Two specimens of the distal portion of the humerus.

**30690.** The greater part of the left ulna.

**30693-5.** Three imperfect specimens of the radius. Each of these bones exhibits three large knobs near the middle, and a fourth close to the distal extremity of the inner (preaxial) border; which probably indicate the existence of warts, or callosities, on this side of the limb. The distal knob is exhibited in a specimen figured in De Blainville's 'Ostéographie,' Genus *Anoplotherium*, pl. v.

**30686-7.** Two specimens of the calcaneum.

**30676-7-8, 30680-1.** Several specimens of the astragalus.

Genus **ANOPLOTHERIUM** (page 188).

**Anoplotherium commune** (page 189).

**M. 1751.** Part of the left ramus of the mandible containing the last five cheek-teeth; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. This specimen agrees precisely with the Vaucluse jaw, No. 26787 (p. 191).

*Purchased, 1884.*

**M. 1779.** Part of the left ramus of the mandible, showing  $\overline{\text{mm. 4}}$ ; from the Upper Eocene of Caylux.

*Purchased, 1884.*

**M. 1814 a.** The fourth left lower milk-molar, in a much-worn condition; from the Upper Eocene of Bach, near Lalbenque (Lot), France.

*Purchased, 1884.*

**M. 1844.** The left astragalus of a large *Anoplotherium*; from the Upper Eocene of Caylux. This specimen is wider and shorter than the astragalus of the so-called *Eurytherium latipes* (page 193); its distal width being 0,056, and its length about 0,069. In the absence of any decided difference in the dentition of the Caylux, Vaucluse, and Paris specimens, it seems very doubtful if this variation can be regarded as of specific value.

*Purchased, 1884.*

**Anoplotherium cayluxense** (page 198).

- M. 1842.** Part of the left maxilla of a young individual; from the Upper Eocene of Bach, near Lalbenque (Lot), France. This specimen shows mm. 3 and mm. 4 in a much-worn condition. *Purchased, 1884.*
- M. 1775.** Part of the right ramus of the mandible of a young individual, showing mm. 3 and mm. 4; from Bach. *Purchased, 1884.*

Family **CHÆROPOTAMIDÆ** (page 247).Genus **ELOTHERIUM** (page 249).**Elotherium magnum** (page 249).

- M. 1727.** The second left upper true molar; from the Upper Eocene of Caylux (Tarn-et-Garonne), France. *Purchased, 1884.*
- M. 1439, 1440.** Two canines (one imperfect); from the Upper Eocene of Caylux. *Purchased, 1884.*
- M. 1454.** The first left lower premolar; from the Upper Eocene of Caylux. *Purchased, 1884.*

**Elotherium mortoni**, Leidy<sup>1</sup>.

Syn. *Archæotherium mortoni*, Leidy<sup>2</sup>.

This species is considerably smaller than *E. magnum*.

*Hab.* North America.

- 29686.** A left lower true molar; from the Miocene of the White River, Dakota, U. S. A. *Purchased, 1855.*

Genus **CEBOCHÆRUS**, Gervais<sup>3</sup>.

The writer provisionally follows Flower in referring this genus to the present family. It is referred by Filhol in the *Ann. Sci. Géol.* vol. viii. art. 1, p. 107, to the group "Pachysimiens," and is considered to present characters connecting *Chæropotamus* with the lemuroid Primates. The third lower molar has a well-developed talon.

<sup>1</sup> Proc. Ac. Nat. Sci. Philad. for 1857, p. 89 (1858), *Archæotherium*.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> Zool. et Pal. Françaises, 1st ed. vol. ii. Exp. no. 35 (1848-52).



**Cebochoerus minor**, Gervais<sup>1</sup>.

This is the smallest species of the genus, and is characterized by the presence of only three roots to the upper true molars.

*Hab.* France.

- M. 1837.** Fragment of the left maxilla, containing  $\overline{m.1}$  (broken) and  $\overline{m.2}$ ; from the Upper Eocene of Lamandine-Basse, near Caylux (Tarn-et-Garonne), France. This specimen agrees precisely with the one figured by Filhol in the *Ann. Sci. Géol.* vol. viii. pl. xiv. fig. 287.

*Purchased*, 1884.

## Family SUIDÆ (page 250).

Genus **HYOTHERIUM** (page 253).**Hyotherium typum** (page 254).

- M. 1838.** Part of the right ramus of the mandible, with the three true molars; from the Upper Eocene of Bach, near Lalbenque (Lot), France. *Purchased*, 1884.
- M. 1835.** Part of the symphysis and right ramus of the mandible; from the Upper Eocene of Caylux (Tarn-et-Garonne). *Purchased*, 1884.
- M. 1840.** Part of the right ramus of the mandible, with  $\overline{m.3}$ ; from Bach. *Purchased*, 1884.
- M. 1395.** Part of the left ramus of the mandible with  $\overline{m.2}$  and  $\overline{m.3}$ ; from the Upper Eocene of Caylux. The length of  $\overline{m.3}$  is 0,017, and that of  $\overline{m.2}$  0,013. *Purchased*, 1884.
- M. 1395 a.** Fragment of the right ramus of the mandible, with  $\overline{pm.3}$ ,  $\overline{pm.4}$ , and  $\overline{m.1}$ ; from the Upper Eocene of Caylux. The length of  $\overline{m.1}$  is 0,012. *Purchased*, 1884.

<sup>1</sup> *Zool. et Pal. Générales*, sér. 2, p. 48 (1876).

## Family HIPPOPOTAMIDÆ (page 277).

Genus **HIPPOPOTAMUS** (page 277).*Hippopotamus amphibius* (page 277).

The following specimens were obtained from the Pleistocene of Barrington, Cambridgeshire. (*Purchased*, 1885.)

- M. 2521. The greater portion of the mandible of a male, showing the incisors and canines.
- M. 2522. Sixty specimens of upper and lower cheek-teeth.
- M. 2523. Numerous incisors and upper canines.
- M. 2524. Four lower canines of males.
- M. 2525. Several imperfect lower incisors.
- M. 2526. Two imperfect humeri.
- M. 2527. An imperfect left femur.
- M. 2528. Two imperfect right calcanea.
- M. 2529. Two astragali.
- M. 2530. Nine imperfect vertebræ.



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